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2000



**REPORTS**  
**OF**  
**TECHNICAL COMMITTEES ON**  
**OCCUPATIONAL DISEASES**  
**IN**  
**WORKMEN'S COMPENSATION ACT, 1923**

**(1955 & 1959)**



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**OF**  
**TECHNICAL COMMITTEES ON**  
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**IN**  
**WORKMEN'S COMPENSATION ACT, 1923.**

**(1955 & 1959)**

# PART I

**R E P O R T**  
**OF THE TECHNICAL COMMITTEE**  
**APPOINTED IN 1955 TO SUGGEST**  
**MODIFICATIONS IN THE LIST OF OCCU-**  
**PATIONAL DISEASES IN SCHEDULE III**  
**TO THE WORKMEN'S COMPENSATION**  
**ACT, 1923.**



सत्यमेव जयते

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**Report of the Technical Committee appointed by the Government of India to suggest modifications in the list of Occupational Diseases in Schedule III to the Workmen's Compensation Act, 1923.**

1. The initial move for the appointment of the Technical Committee was made by the Ministry of Labour to go into the question of amendments to Schedule III of the Workmen's Compensation Act, 1923.

2. In pursuance of this decision, the Government of India gave sanction on December 2, 1955 to the appointment of a Technical Committee. The following persons were appointed to serve on the Committee vide letter No. SS. 152(29) dated the 2nd December, 1955 :

**Chairman**

1. Dr. M. N. Gupta  
Deputy Chief Adviser Factories (Medical)  
Ministry of Labour and Employment.

**Members**

2. Dr. M. L. Rawal,  
(Representative of the Chief Inspector of Mines)
  3. Dr. M.N. Rao,  
(Representative of the Director-General of Health Services)
  4. Major D.R. Sharma,  
(Representative of the Employees' State Insurance Corp)
  5. Dr. A.S. Sen,  
(Representative of the Govt. of Bombay)
  6. Dr. A. Prodhan,  
(Representative of the Govt. of West Bengal)
  7. Dr. H.N. Sahay,  
(Representative of the Government of Bihar)
  8. Dr. H.P. Dastur,  
(Representative of the Employers' Federation of India)
  9. Dr. K.C. Gupta,  
(Representative of the All-India Organisation of Industrial Employers)
  10. Dr. S.L. Kashikar,  
(Representative of the I.N.T.U.C.)
  11. Shri R.C. Pradhan,  
(Representative of the Hind Mazdoor Sabha)
  12. Dr. K.S. Basu,  
(Representative of the Society for the study of Industrial Medicine, India)
3. The Representative of the All-India Organisation of Industrial Employers (Dr. K.C. Gupta, Professor of Medicine and Therapeutics, Seth V.S. General Hospital and Research Institute Ahmedabad), however, communicated his inability to attend the meeting.
4. The original Representative of the Hind Mazdoor Sabha (Dr. Shanti G. Patel) was replaced by Shri R.C. Pradhan who worked on the Committee on the request of the Hind Mazdoor Sabha,

**5. The terms of reference of the Committee were as given below :—**

(i) To advise which of the undermentioned diseases might be included in Schedule III and to suggest the name of employment or employments in which the incidence of each disease occurs or is liable to occur.

- A.
  - 1. Silicosis.
  - 2. Byssinosis.
  - 3. Pneumoconiosis.
  - 4. Asbestosis.
  - 5. Bagassosis.
- B.
  - 1. Poisoning by halogen derivatives of the hydrocarbons of the aliphatic series.
  - 2. Poisoning by manganese.
  - 3. Toxic anaemia.
  - 4. Toxic jaundice.
  - 5. Carbon disulphide poisoning.
- C.
  - 1. Cataract due to infra-red radiations.
  - 2. Dermatitis.
- D.
  - 1. Miner's Nystagmus.
  - 2. Beat hand.
  - 3. Beat knee.
  - 4. Beat elbow.
  - 5. Inflammation of the synovial membrane of the wrist joint and sheaths.
- E.
  - 1. Telegraphist's cramp.
  - 2. Writer's cramp.
  - 3. Twister's cramp.
- F.
  - 1. Nickel Carbonyl.
- G.
  - 1. Leptospira Ictero-Haemorrhagica.
  - 2. Ankylostomiasis.

(ii) To recommend what modifications, if any, in the description of occupational diseases or employment in Schedule III should be made particularly in view of the provisions of Convention (42) concerning Workmen's Compensation (Occupational Diseases); and

(iii) To advise on the criteria for assessing incapacity and of compensation for the disease so included taking into consideration the likely incidence of the disease.

**6. Method of working.**

As the time at our disposal was short, it was decided that information on existing conditions and opinions on various matters regarding the occu-

pational diseases for the Workmen's Compensation Act be circulated in advance among the members of the Committee. This was done to help the members to get an idea of the available information on existing conditions and other relevant factors regarding occupational diseases. The information given in the memoranda helped us greatly in making our opinions.

## 7. Meetings

The meetings of the Committee were held from the 24th to 29th of December, 1955, in the Chief Adviser Factories office in New Delhi. The gist of the discussions and the decisions made at the meetings are embodied in the "Appraisal and Recommendations" given below in this Report.

8. All of us who have in one capacity or the other to deal with the subject of occupational diseases are of the opinion that it needs further greater encouragement for its development and study.

9. The terms of reference given to the Committee cover a wide, range, both technical and administrative, for the future development of occupational health legislation in India and efficient implementation of the proposals in connection thereof. The Committee after mature deliberations came to the following general conclusions which may form the basis of future legislation in this regard.

## 10. Terms of Reference

No. 1 (To advise which of the diseases might be included in Schedule III and to suggest the name of employment or employments in which incidence of each disease occurs or is liable to occur.).

### A. 1. Silicosis :

The Committee decided as follows :

Silicosis— All workmen exposed to the inhalation of dust containing silica—Certification shall be by a special Medical Board approved for the purpose under the Act.

Each case shall be certified after radiographic diagnosis in a living workman or post-mortem examination in the case of a deceased workman.

The approved Medical Officer should ordinarily be a Tuberculosis Officer.

2. Byssinosis. The Committee decided against its inclusion at present in the list of compensable occupational diseases, and recommended consideration after further research and experience by a Technical Committee at a later date.

3. Pneumoconiosis. The Committee agreed to include only Coal Miner's Pneumoconiosis as a compensable disease for the present.

The Committee, however, took notice of the existence of pneumoconiosis in other industries, but in view of lack of information in other industries decided not to include the generic term "pneumoconiosis" for the present.

**4. Asbestosis.** The Committee agreed to the inclusion of Asbestosis as a compensable disease as follows :—

Asbestosis—All workmen and similarly placed employees engaged in producing fibro-cement materials, producing asbestos, mill board and other articles or processing of ores containing asbestos.

**5. Bagassosis.** The Committee agreed to the inclusions of Bagassosis as a compensable disease as follows :—

Bagassosis—All workmen and similarly placed employees engaged in producing bagasse mill board, and other articles from bagasse.

**B. 1. Poisoning by halogen derivatives of the hydrocarbons of the aliphatic series.**

The Committee agreed to the inclusion of poisoning by halogen derivatives as follows :—

Halogenated hydrocarbons of the aliphatic series and their halogen derivatives.	Any process involving manufacture, distillation and use of hydrocarbons of the aliphatic series and their halogen derivatives.
---	--

**2. Poisoning by Manganese.**

The Committee decided against its inclusion at present in the list of compensable occupational diseases and recommended consideration after further experience and research by a Technical Committee after about two years.

**3. Toxic anaemia, and**

**4. Toxic jaundice.**

The Committee was of the opinion that the various causative agents of toxic anaemia and toxic jaundice are covered by the halogenated hydrocarbons of the aliphatic series and benzene and its homologues and its nitro and amido derivatives and other chemicals used in industry. As such these should not be included as compensable occupational diseases.

**5. Carbon disulphide poisoning.**

The Committee agreed to the inclusion of poisoning by carbon disulphide as follows :—

Poisoning by Carbon Disulphide and its sequelae.	All workmen and similarly placed employees engaged in manufacture of carbon disulphide; artificial silk by Viscose process; rubber industry, all other industries where workmen are engaged in producing or using products containing carbon disulphide or exposed to emanations from carbon disulphide.
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### C. 1. Cataract due to infra-red radiations

The Committee agreed to the inclusion of cataract due to infra-red radiations as follows :—

**Occupational Cataract due to infra-red radiations.**

All workmen and similarly placed employees engaged in processes of manufacture in which they are exposed to glare from molten material or to any other sources of infra-red radiations.

### 2. Dermatitis

The Committee agreed to the inclusion of Dermatitis and adopted the I.L.O. nomenclature as approved at the December 1954 meeting of its Correspondence Committee on Occupational Safety and Health as follows :—

Skin disease proved or believed to be caused by specific employment, process or agent and resulting in the worker having to abandon that employment temporarily or permanently.

All workmen and similarly placed employees in specific employment or process using specific agent.

(The law will lay down the specific employment, process or agent from time to time).

- D. 1. Miner's Nystagmus.  
2. Beat Hand.  
3. Beat Knee.  
4. Beat Elbow.  
5. Inflammation of the synovial membranes of the wrist joint and sheaths.

The Committee decided against their inclusion at present in the list of occupational diseases and recommended consideration after further investigations by a Technical Committee after some years.

- E. 1. Telegraphist's Cramp.  
2. Writer's Cramp.  
3. Twister's Cramp.

The Committee decided against their inclusion at present in the list of compensable occupational diseases and recommended their consideration after further information and investigation as regards their prevalence.

### F. Nickel Carbonyl

The Committee agreed that as nickel carbonyl poisoning did not at all exist in India, it should not be included in the list of occupational diseases.

- G. (1) Leptospira Ictero-Haemorrhagica.  
(2) Ankylostomiasis.

The Committee agreed that both these diseases in India should not be included in the list of compensable occupational diseases at present.

11. **Term of Reference No. 2.:** (To recommend what modifications if any, in the description of occupational diseases or employment in Schedule III should be made particularly in view of the provisions of Convention (42) concerning Workmen's Compensation (Occupational Diseases).

i. The Committee agreed to add the words "amido and nitro derivatives" in "poisoning by benzene.....etc." in Schedule III as follows :—

Any process involving manufacture, distillation, or use of benzene, benzol, benzene homologues and amido and nitro derivatives of above.

ii. The Committee was otherwise satisfied with the existing list of diseases in Schedule III of the Workmen's Compensation Act.

12. **Term of Reference No. 3.:** (To advise on the criteria for assessing incapacity and of compensation for the diseases so included taking into consideration the likely incidence of the disease)

i. The Committee recommends that in all cases of compensable disease the following criteria should be used in assessing incapacity (disablement):

- (a) Anatomical disability.
- (b) Functional incapacity.
- (c) Loss of earning capacity.

ii. The Committee also recommends that compensation should be related to the disability as assessed by the three factors given above and not to the loss of earning capacity alone.

### Appraisal and Recommendations

13. The recommendations regarding assessment and evaluation of disability in cases of pneumoconiosis for the purpose of these recommendations will mean,

- (1) Silicosis.
- (2) Asbestosis.
- (3) Bagassosis, and
- (4) Coal Miner's Pneumoconiosis.

14. Pneumoconiosis varies so much in its appearance and effects in different industries that no general standards can be defined for the compensation of pneumoconiotic conditions.

15. Further research, study and factual experience is required in each industry with the dust hazard for the type of pneumoconiosis in order to

establish correlation of the clinical symptoms and signs including radiological findings with the existence of disability.

16. Each industry requires a study of the secondary changes in the respiratory and circulatory systems for these are frequently the cause of disability.

17. A technically satisfactory skiagram of the chest is an essential requisite in the diagnosis of pneumoconiosis.

18. A system of radiological classification absolutely unrelated to any question of clinical diagnosis, or pathology or compensation should be evolved

19. This classification would be of great value in initial surveys of silicosis and in periodical surveys of workers in various industries with a dust hazard.

20. To assist in consistent classification, it is suggested that standard reference radiographs exemplifying the categories should be held by a Central body.

21. In the diagnosis of pneumoconiosis the history and conditions of exposure to harmful dust, the clinical examination and radiographic findings are each of importance. The diagnosis of pneumoconiosis must not rest solely on the radiograph.

22. A radiograph cannot alone help to determine the amount of disability present.

23. Pre-employment and periodic examinations of the workers including the radiological examination of the lungs should be compulsory in all specified industries where there is a dust hazard.

24. The records of these and all other examinations should be available to a Medical Board examining claimants for pneumoconiosis.

25. For the diagnosis of pneumoconiosis and the assessment of disability associated with it, expert medical advice in the form of Pneumoconiosis Medical Board should be established as the official impartial certifying body.

This Board should consider.

1. Whether there is any abnormality due to dust inhalation ?
2. Whether it is present to such a degree as to make it dangerous to continue working in the same environment ?
3. Whether a man is disabled as a result of the abnormality ?
4. Whether there is any loss of earning capacity, if so, to what extent ?

The findings of this Board should be final and conclusive.

26. The Committee recommends that for a given industry compensation shall be paid for the presence of specific lung changes due to pneumoconiosis as revealed in the radiograph or at postmortem examination

and the existence of disability as a result of those change. Compensation should be considered whether the disability is partial or total.

In this regard the Committee likes to point out that,

1. some forms of pneumoconiosis are progressive and disability increases even after withdrawal from dust exposure ;
2. a man with partial disability may progress to total disablement in his present work if the dust hazard still exists, and
3. men are known to continue work long after they are definitely disabled from it on account of inadequate compensation payments.

27. The Committee recommends the recognition of the secondary and associated changes which may increase disability out of all proportion to radiographic appearances. Blanket coverage is extremely difficult to apply in view of the present state of knowledge of the pneumoconioses.

28. The Committee recommends that provision should be made for,

1. medical care and rehabilitation of people suffering from pneumoconiosis ;
2. if in a worker pneumoconiosis is associated with pulmonary tuberculosis, he should not be permitted to work in any dusty occupation after cure ;
3. compensation should be provided for dependents if death is certified as due to pneumoconiosis.

29. It is extremely necessary to provide for post-mortem examination in case diagnosis is not established before death.

30. The estimation of disability as a result of pneumoconiosis especially in its partial degrees, is very difficult.

There is urgent need to develop the subject of cardio-respiratory physiology to have simple physiological tests to determine cardio-pulmonary disability.

31. The effect of medical and technical preventive measure cannot usually be seen until eight to ten years later ; hence it is necessary that for such dusty industries as the laws require compensation, preventive hygiene laws should be enacted as early as possible to lay down standards of hygiene in such work places.

32. The Committee recommends.

1. further study of pneumoconioses other than those included in the list *e.g.*, byssinosis, with a view to making them compensable occupational diseases in the future ;
2. compensation for occupational diseases may have to be paid to all workers exposed to the harmful environment including those that are not employed in specified processes involving exposure to the harmful dust ;
3. requirement regarding past employment *i.e.* minimum duration of qualifying employment or length of time during which workers must

have been engaged in specified occupations in order to qualify for benefits in case of pneumoconiosis.

5 years in case of silicosis.

3 years in case of bagassosis.

7 years in case of coal miner's pneumoconiosis.

3 years in case of asbestosis.

4. Cessation of employment, *i.e.* if a limit is to be placed upon the time which must elapse between cessation of prescribed employment and incapacity or death.

33. The Committee recommends that Pneumoconiosis Investigation Units should be established by the Centre and the States to,

1. investigate causes, progress and possible treatment of pneumoconiosis and advise on rehabilitation of silicotics in special hospitals or institutions ;
2. carry out investigations on medical, pathological, environmental aspects including physical, chemical and pathological studies ; and experimental studies including analysis of the mineral deposits found in the lungs, animal experiments to find tissue reaction of these deposits, and other studies on various kinds of dusts ;
3. investigate the problems of silicosis, pneumoconiosis in various mining and other industries by carrying out medical and environmental surveys ;
4. encourage research into problems of suppression of dust in mines and factories ;
5. encourage appointment of special Dust Officers to carry out routine dust surveys in mines and factories.

34. There is urgent need that all industries should have a comprehensive Industrial Health Service. This Service should include experts on industrial medicine, occupational physiology, epidemiology and industrial hygiene.

35. All diseases recommended by the Committee to be included as compensable in the Workmen's Compensation Act, Schedule III, should also be made notifiable under the relevant labour laws., *e.g.* Factories Act and Mines Act.

### SUMMARY OF RECOMMENDATIONS

36. The main task assigned to our Committee was to recommend to the Government a list of diseases which could be included in the Workmen's Compensation Act and to advise on the assessment of disability and compensation for such diseases.

37. We have reached the conclusion that silicosis, asbestosis, bagassosis and coal miner's pneumoconiosis, poisoning by halogen derivatives of hydrocarbons of the aliphatic series, carbon disulphide poisoning, occupational cataract due to infra-red radiations, occupational dermatitis and poisoning by nitro and amido derivatives of benzene and its homologues should be included in the list of compensable occupational diseases.

38. With regard to assessment of incapacity and of compensation for the diseases so recommended, we have arrived at certain conclusions and have indicated various difficulties and problems in the Appraisal and Recommendations.

39. Lastly, but not in the least, the Committee would like to draw attention to the fact that the Committee has not endeavoured to make any provisions regarding some very important aspects of occupational chest diseases, such as, classification of skiagrams compensation rules for silicosis, pneumoconiosis, asbestosis etc; compensation; functions of Pneumoconiosis Medical Boards; and medical and engineering control programmes necessary for such compensable diseases. A Committee of experts should make such recommendations as early as possible.

40. We would like to record our thanks to the Government of India who have given an opportunity to the members of this Committee to discuss a subject of great importance for the promotion of health and welfare of our industrial workers.



## PART II

**REPORT OF THE TECHNICAL COMMITTEE APPOINTED IN 1959 TO ADVISE GOVERNMENT REGARDING THE QUALIFYING PERIOD FOR NEW DISEASES INCLUDED IN THE WORKMEN'S COMPENSATION ACT, 1923, BY AMENDMENT ACT, 1959, ETC.**

नमो भगवते वासुदेवाय

## Chapter 1

The Committee was appointed by the Government of India, Ministry of Labour and Employment under letter No. Fac. 152(47)/49, dated 6th May 1959, which is reproduced below :—

“No. Fac. 152(47)/59,  
Government of India  
Ministry of Labour & Employment

From

Shri P.D. Gaiha,  
Under Secretary to the Government of India,

To

- (1) The Director General,  
Employees, State Insurance Corporation,  
New Delhi.
- (2) The Coal Mines Welfare Commissioner,  
Coal Mines Labour Welfare Fund, Dhanbad.

Dated New Delhi, the 6th May, 1959.

*Subject* : Appointment of a Committee to advise Government regarding the qualifying period for new diseases included in the Workmen's Compensation Act, 1923, by Amendment Act, 1959, etc.

Sir,

I am directed to say that it has been decided to appoint a small Committee consisting of the following members to advise the Government of India in respect of the matters referred in para 2 below :—

1. Dr. M.N. Gupta, Deputy Chief Adviser Factories (Medical), Chairman.
  2. A representative of the Director General Employees' State Insurance Corporation.
  3. A representative of the Superintendent, Central Hospital, Coal Mines Labour Welfare Fund, Dhanbad/Asansol.
2. The terms of reference of the Committee will be:—
1. to suggest qualifying period or periods in respect of the following occupational diseases :—
    - (a) Silicosis,
    - (b) Coal Miner's Pneumoconiosis,
    - (c) Asbestosis, and
    - (d) Bagassosis,
- with reference to section 3(ii) of the Workmen's Compensation (Amendment) Act, 1959, a copy of which is enclosed.



(2) to frame draft model rules for the guidance of the State Governments with reference to Section 16 of the Amendment Act, for :—

- (a) prescribing the manner in which diseases specified as occupational diseases may be diagnosed ;
- (b) prescribing the manner in which disease may be certified for any of the purposes of this Act ;
- (c) prescribing the manner in which and the standard by which incapacity may be assessed.

3. It is requested that the name of your representative who will work on the Committee may please be intimated to this Ministry and Dr. M.N. Gupta, Deputy Chief Adviser Factories, New Delhi, immediately. Dr. Gupta is being instructed to convene a meeting of the Committee as soon as nominations are received.

Yours faithfully,

Sd/- P.D. Gaiha,  
Under Secretary.

Copy to Dr. M.N. Gupta, Deputy Chief Adviser Factories (Medical) for necessary action for convening a meeting of the Committee as soon as nominations have been received.

Copy also forwarded to M-II Section and PH1 Section.

Sd/- P. D. Gaiha,  
Under Secretary.

In response to the above letter, the following two nominations for membership were received :—

#### Members

1. Major D.R. Sharma, Asstt. Medical Commissione (Representative of Employees' State Insurance Corporation) 13-5-59.
2. Dr. K. Damodaran, Superintendent, Central Hospital, Asansol, (Representative of the Coal Mines Welfare Fund) 12-5-59.

We would like to emphasise that all three of us have been appointed on the Committee each in his personal capacity and not as representing any particular interests in the Workmen's Compensation legislation.

The Committee could not start its work on account of the long illness of Major D.R. Sharma till about the end of July when the first communication from him was received.

#### Comments on the Terms of Reference

1.2 Subject to three comments which will appear later, this is the second time during the course of four years, that a Committee of doctors has been appointed by the Government of India to deal exclusively with problems of occupational diseases under the Workmen's Compensation law.

The first Committee was appointed by the Government of India in 1955, under the Chairmanship of Dr. M.N. Gupta (Major D.R. Sharma was also one of the members) to suggest modifications in the list of occupational diseases in Schedule III to the Workmen's Compensation Act, 1923. This Committee was appointed for certain limited purposes, and though other matters were considered and reported upon by this Committee as incidental to their main terms of reference, the various legal aspects of compensable dust diseases (silicosis, coal miners' pneumoconiosis, asbestosis and bagassosis) have not so far received a close and detailed scrutiny.

Until 1953, (the date of publication of the first Government Report—Silicosis in Mica Mines in Bihar), the subject of dust diseases in mining and factories industries had not received any consideration from any State except in the State of Mysore where Silicosis Rules have been in existence since 1940 and workers in gold mines in the State are receiving compensation.

The studies in silicosis and other occupational diseases carried out by the Chief Adviser Factories Organisation of the Ministry of Labour and Employment (during 1952-58<sup>(\*)</sup>) were a jump from the obscure, scarcely recognised diseases hidden for centuries in the chest of workers in various dusty industries encouraged a real scientific appraisal and discussions in the Parliament debates. This unusual interest was not due primarily to sudden realisation of the presence in industries of great health hazards but to a rude awakening to the fact that a very important economic hazard would be found menacing industry if and when dust diseases (pneumoconioses) found a place in the schedule of occupational diseases of the Workmen's Compensation Act.

1.3 The first limitation, which, in the opinion of the Committee, exists on the scope of the present terms of reference is the exclusion of consideration of other occupational diseases now added in Part B of Schedule III of the amended Act.

1.4 We must also note here that we are required to frame draft Model Rules for the guidance of the State Governments. Many of proposals are of a technical nature and the State Governments would need long explanatory notes and discussion of background material to the Rules before they would be in a position to adopt these Rules.

It also appears quite impossible for us to consider for example the Rules prescribing the manner in which diseases specified as occupational diseases may be diagnosed without going into the technical aspects of diagnosis. In the result, it will be found that we have dealt with a number of technical, administrative, organisational and functional aspects which are inevitably connected with such matters, and in doing so we have drawn largely upon the information contained in a large variety of publications, indigenous as well as foreign.

1.5 The Committee realises that the various medical, technical, administrative, organisational and functional aspects of the subject are capable of separate study and consideration but feel, nevertheless, that having regard to the over-riding importance of money compensation, a composite view of the future planning of the subject of pneumoconiosis has been made more difficult by the exclusion of a number of important aspects like, establishment

<sup>\*</sup> Chief Adviser Factories- List of Reports and Returns—Annexure "A".

of diagnostic centres, advisory councils, certifying boards, treatment centres rehabilitation facilities, vocational training of silicotics, unified administration of compensation laws, from the scope of our work. These problems are inextricably mingled with other important questions under our consideration and we have felt it our duty to refer to them, though of necessity, in rather general terms. To this extent our recommendations on related matters are not as complete or final as we would have wished them to be. We have, however, made certain suggestions towards the end of the report (Chapter 9, p. 37) in the hope that it may be that Government will, in the near future, find it necessary to appoint another Technical Committee to make a proper investigation of these issues.

### **Our approach to the Terms of Reference**

1.6 The Committee was convinced from the beginning of the need for studying in detail the laws prevailing in other industrially advanced countries. Since the questions arising out of the Terms of Reference were not only of a factual character but fundamental problems not previously considered at all in Indian laws, we also found that some of the recommendations of the previous Committee (1955) were connected with the present Terms of Reference. This was perhaps inevitable in respect of the second Term of Reference specially (to draft model rules for the guidance of the State Governments with reference to Section 16 of the Amendment Act) and raised numerous and complicated issues of diagnosis, assessment of disability and certification. These recommendations of the first Committee have been studied in detail and exhaustive notes provided in the text of the present report.

The association of three doctors, each representing his speciality and experience, proved of great help in providing answers to questions which should be a guide to those who will be concerned with the formulation of laws.

1.7 There has been some delay in the submission of the report mainly because of the fact the Chairman has been engaged on investigations in occupational diseases in two of the principle mining industries in India, i.e., Manganese and Coal, which necessitated his very frequent absence from headquarters in Delhi, owing to which more frequent meetings of the members in Delhi, could not be held and lengthy correspondence caused some unavoidable delays.

1.8 The Committee had finalised its deliberations in December, 1959, but to our sad regret news of the untimely demise of Dr. K. Damodaran in Asansol was received on 22nd January, 1960.

We, the two remaining members of the Committee, would like to record here our deep-felt sympathies for our departed colleague.

### **Obituary**

We regret to record the death on 12th January, 1960 at his residence in Kalla (Asansol), of Dr. K. Damodaran at the age of 53. He was associated with the work of the Committee on Workmen's Compensation Act since June, 1959.

His sudden departure is a great loss to the medical profession and to the service in which his undoubted administrative ability was increasingly valued and his knowledge of and interest in occupational medicine, greatly relied on. He was keenly devoted to health in coal mining industry and his passing away has been greatly and widely mourned.

## CHAPTER 2

### **Compensation for Silicosis, asbestosis and other forms of Pneumoconiosis.**

(Note : Except where the context indicates otherwise, the term **pneumoconiosis** is used throughout this report in a generic sense in reference to any pulmonary disease resulting from exposure to dust during employment.

In any approach to the discussion of the subjects, which constitute the terms of reference of the Committee, the Committee has found it necessary to make certain general observations in order to highlight the difficulties that faced the Committee in the execution of the task entrusted to it.

2.1 The Committee studies in great detail the special provisions concerning compensation for pneumoconiosis found in the legislation of about 30 countries (I.L.O. Legislative Series Vol. 1951-1959.)

2.2 It is not the Committees' intention to make an exhaustive summary of all provisions of the general compensation laws applicable to pneumoconiosis.

2.3 The Committee would only like to set forth, rather the data, selected from amongst those likely to possess the greatest utility for the purpose of this report.

### **Silicosis, Pneumoconiosis Compensation Legislation in Great Britain**

The British Compensation Acts have served as a model for and influenced the legislation of a large number of countries and it is worth while mentioning some of the salient features in the development of these in Great Britain

In 1919, Silicosis for the first time was recognised as a compensable disease under the Refractories Industries (Silicosis Scheme) but only under certain conditions and only in respect of workmen employed in the refractories industries, that is to say in men employed in processes carried on at mines, quarries, factories and workshops at which refractory material containing not less than 80% total silica (SiO<sub>2</sub>) is got or manipulated with a view to manufacture or sale.

However, this established a precedent which stimulated extension of the legislation to other industries. Coal miners were included in the Various Industries (Silicosis) Scheme 1928. In 1934 came the Coal Mining Industry (Compensation) Scheme. Persons certified under Various Industries Scheme were designated as suffering from Silicosis, those certified under the latter scheme were designated as suffering from Pneumoconiosis.

From 1931 upto the end of 1949, some 36,000 men had been officially diagnosed by the Silicosis Medical Board or the Pneumoconiosis Panels of the Ministry of National Insurance as being disabled by the diseases. Over 80% of these cases had arisen in the South Wales Coal-fields.

In conclusions, it may be said that this aspect of employer's liability operates according to particular industries, the obligations being brought into force by special schemes, through Rules and Orders. As examples, there are such schemes as the Refractories, Sandstone, Metal Grinding and Asbestos Industries, the Coal Mining Industry (Pneumoconiosis) Compensation Scheme and the Various Industries Scheme (covering mining and quarrying etc.)

The large progress in Workmen's Compensation Law and understanding of problems of silicosis, pneumoconiosis has come through the untiring efforts of a number of bodies over a large number of years e.g. the Silicosis Medical Board, Committee on Industrial Pulmonary Diseases, Pneumoconiosis Research and experience of scores of medical men and Government departments.

2.4 The provisions for the compensation of pneumoconiosis have presented some of the most controversial subjects in legislation in all countries in the world and have taken decades for their evolution. There are variations not only in benefits payable but their duration and quantum; the type of disability recognised; and the concept of disability from these dust diseases.

2.5 The reasons for this legislative hiatus seem to be as follows :—

1. The fact that upon enactment of occupational diseases compensation statutes an employer becomes liable for the so called "accrued" liability resulting from the inhalation of dust prior to the time that the law became effective.
2. Problems incident to the proper diagnosis of the disease.
3. Differentials in the concept of compensable disease.
4. Evaluation of disability.

2.6 With respect to the first of these items, "accrued liability", upon the enactment of the Compensation Statutes, industry is faced with potential liability for pulmonary changes resulting from extended exposure of the employees to the inhalation of dust prior to the effective date of the statute and the employer becomes an insurer of the health of the employee as to these diseases. The employer is stripped of his common law defenses, and the continuation in employment by employees automatically imposes upon the employer responsibility for compensation.

2.7 With respect to the "diagnosis" of pneumoconiosis the Committee would like to record that it is unfortunate that in India no data exist on the occupational morbidity and mortality statistics of miners and workers in dusty trades. Also there are not existing any recorded experience and opinions of existing physicians on the subject.

Silicosis was declared as a Notifiable Disease under Section 89 of Factories Act, 1948, and Silicosis and Coal miners' Pneumoconiosis were declared as Notifiable Diseases in July, 1952 under S.R.O. 1306 dated 21st July, 1952 in pursuance of powers contained under sub-section (1) of Section 25 (Notice of Certain Diseases) of Mines Act, 1952.

On 4th April, 1955, in the Lok Sabha, Dr. Rama Rao wanted *inter alia* to know the number of cases of Silicosis which occurred in 1953-54.

The State Governments of Bihar, Andhra, Rajasthan and Ajmer, reported no cases during this period.

The fact that the various States did not, till very recently, report or notify any cases of silicosis or coal miners' pneumoconiosis may mean any or both of the following two things :—

- (a) The medical practitioners on whom falls the duty of notifying cases of silicosis and coal miners' pneumoconiosis have failed to diagnose these cases because of the absence of an X-ray report on the miner;
- (b) The owner, agent or manager has had no information supplied to him by the medical practitioner or Works Doctor regarding cases of silicosis and coal miners' pneumoconiosis which he should have notified to the Chief Inspector of Mines or the Chief Inspector of Factories.

In any case it appears that in the absence of proper X-ray facilities, proper knowledge and diagnosis, there is very little likelihood that notification of cases of silicosis or pneumoconiosis in factories or mines would be forthcoming.

In his book 'Mining, Processing and Uses of Indian Mica'(\*) Shri Chand Mull Rajgarhia says :

".....Silicosis has become an occupational disease with the introduction of compressed-air drilling in the mica mines. Even to-day in most of the mines drilling is performed dry..... It is difficult to estimate the number of lives lost because of this menace, but it can be said without exaggeration that incidence of silicosis on the mining labour as well as the supervising staff creates a serious problem..... Since the disease is not commonly met outside mining areas where dry drilling is in force, it is sometimes misdiagnosed by the medical practitioners as tuberculosis..... Since symptoms are somewhat similar to those of tuberculosis, it is very difficult for a medical man to diagnose it correctly unless he is provided with a clear and authentic history and findings of each case."

These observations are equally applicable to coal miner's pneumoconiosis and silicosis in other silica-dust hazard carrying industries.

There can be no doubt that silicosis and coal miners' pneumoconiosis present two of the most serious problems in occupational health in India, at least in respect of the number of persons exposed to harmful dust hazard in various types of mining and factory industries working in metals and minerals as given in tables below :—

TABLE—I  
Employment in Industry (\*\*)—1957

Industry	Underground	Open working	Surface	Total
Coal	2,05,755	1749	1,12,740	3,70,244
Mica	20,293	5,060	8,914	35,267
Manganese	2,293	89,809	18,112	1,10,214
Iron Ore	16	29,240	11,089	40,345
Gold	10,447		6,642	17,089
Lime Stone, etc.		26,226	6,528	32,754
Others	5,263	28,514	11,631	45,408
Total	2,44,067	2,21,598	1,85,656	6,51,321

(\*) Edition 1951, p. 177.

(\*\*) The Indian Labour Year Book—1958, P.8.

TABLE—II

Employment in Factory Industries—1957(\*\*)

Factories	No. of Factories	Average daily Employment
Artificial Manure	67	9,035
Clay Products (Structural)	517	41,777
Glass & Glass Products	217	35,296
Pottery, China, Earthenware	94	14,500
Cement	30	24,952
Stone dressing & crushing	248	7,808
Asbestos Products	9	4,532
Basic Metal, Ferrous—Iron & Steel	13	53,286
Rough Castings	310	22,843
Non-ferrous—Smelting	29	5,687
Rough Castings	48	1,314
Cutlery and Locks	66	2,840
Total	1,648	2,24,870

The separate totals are significant in that they indicate the wide extent of this kind of hazard. The degree of hazard in each industry varies, as well as variations are found in similar jobs in different industries. The above figures only indicate the possible numbers (9,00,000) exposed to dust hazard in the chief mining, quarrying and manufacturing industries especially silica dust and there may be another 100,000 in other industries and processes exposed to other harmful dusts mentioned above. The one million figure is a conservative estimate of the number of workers engaged now in the country exposed to silica dust to a harmful degree.

This fact alone poses problems of immense dimensions in the diagnostic field for the medical men. There would be many administrative and technical problems whose importance cannot be forecast and whose solution could not be suggested in advance.

Diagnosis of silicosis, coal miners' pneumoconiosis, etc. is made by clinical, pathological and radiological examinations; family personal and occupational histories, which together with physical examinations are usually considered necessary. It is generally accepted that at least upto the present, the X-ray offers the best indication of the lung changes that occur in silicosis and coal miner's pneumoconiosis particularly in the early stage; however the X-ray in itself appears to be anything but reliable in the definite determination of the disability arising in these diseases.

Classification of the fibrotic changes revealed by the X-ray has been made by a large number of American authorities (Eck and Hanaut, S.W. Verste (South Africa), Dr. Cazamian and by the specialists of the Pneumoconiosis Research Unit, U.K.) and there are conflicting views on the subject.

At the Third International Conference of Experts on Pneumoconiosis\* (held in Sydney in March 1950) the following conclusions were reached by the Conference regarding the early diagnosis of pneumoconiosis and differential diagnosis.

\* Record of I.L.O. Proceedings 1953

"In the diagnosis of Pneumoconiosis the history and conditions of exposure to harmful dusts, the clinical examination and radiological findings are each of importance. The diagnosis of Pneumoconiosis must not rest solely on the radiograph."

"With regard to the radiological investigations of Pneumoconiosis, as an initial step, the classification of radiographs should be as in the suggested International Scheme, provided however that it is clearly understood that **this classification is one which deals with radiographic appearances only and cannot be used for any other purposes**, such as the assessment of clinical conditions or disability. It is not sufficiently exhaustive to be applicable to all forms of Pneumoconiosis."

With respect to the diagnosis of Pneumoconiosis, the Committee is of the opinion that there is limited general medical knowledge regarding these diseases, however, industrial medicine has made great progress in this field and efforts will be required to rapidly get this knowledge infiltrated down to the general practitioner's level.

The subject of diagnosis, however, will remain a matter of great concern to those industries having dust hazards and to insurance carriers responsible upon such risks.

2.8 With respect to the "concept of disability", the Committee observes that there are material differences in the legislative provisions of Workmen's Compensation laws in different countries. They fall, in main, into four classes as follows :—

- (a) Inability of the injured employee to earn full wages in the employment in which he was last employed.
- (b) Total disability rendering the employee unable to perform any further work in his then occupation or in any other trade, business or occupation.
- (c) The event of becoming incapacitated either partially or totally, from performing his work in the last occupation in which he was exposed to the hazard of such disease.
- (d) The event of becoming incapacitated from performing his work or from earning equal wages in other suitable employment.

2.9 The basic concept of disability upon the enactment of Workmen's Compensation laws was to provide monetary compensation for injuries resulting in a **loss of wage earning capacity** resulting from the traumatic injuries or occupational diseases arising out of and in the course of employment. This concept has changed. In all countries, in an effort to liberalise the administration of the laws, compensation has and is being awarded not for wage loss but might be termed to be **damages** sustained by an employee during the course of his employment irrespective of wage loss.

2.10 It must, however, be stated that our legislatures, commissions and courts interpreting and administering Workmen's Compensation laws are tending to award compensation for loss of earnings irrespective of cause.

2.11 The first Technical Committee appointed by the Government of India suggest modifications in the list of Occupational Diseases (1955)



recommended that in all cases of compensable diseases, the following criteria should be used in assessing incapacity (disablement) :

- (a) Anatomical disability.
- (b) Functional incapacity.
- (c) Loss of earning capacity.

This Committee also recommends that compensation should be related to the disability as assessed by these three factors and not to the loss of earning capacity alone.

2.12 Liability is dependent on proof of damage. While, proof of damage is essential to success in an action founded on negligence (negligence, in itself, is not a tort) or breach of statutory duty this aspect of the matter is logically distinct from the law of damages.

The law of damages is concerned with the various elements of damages for which compensation may be claimed, and with the method of assessing compensation.

2.13 The general principle is indicated in the following words of Lord Dunedin in *Admiralty Comrs V. Valeria* (1922) 2 A.C. 242 at p. 248.

"The true method of expression, I think is that in calculating damages you are to consider what is the pecuniary sum which will make good to the sufferer, so far as money can do so, the loss which he has suffered as the natural result of the wrong done to him."

Of course money can never really compensate for the loss of a limb or other serious injuries or diseases; but it would not be right on this account, to award an altogether excessive sum.

2.14 The general approach to the assessment of damages for personal injuries was well expressed by Field, J., in his summing up to the Jury in *Phillips V. South-Western Rail Co.*, (1879), 4, Q.E.D. 406 :

"Perfect compensation is hardly possible, and would be unjust. You cannot put the plaintiff back again into his original position, but you must bring your reasonable common sense to bear, and you must always recollect that this is the only occasion on which compensation can be given."

2.15 There are many relevant considerations in assessing damages for personal injuries; such as loss of earning capacity, loss of amenities of life, pain and suffering, loss of expectation of life, and a disability involving constant attendance.

2.16 In most personal injuries' claims, the loss of earning is probably the largest single factor. Loss of earnings up to the date of trial, is alleged and proved as part of the special damages; prospective loss after that date is included in the general damages. The plaintiff may be disabled altogether from earning his living in the future, or his disablement may be partial. It is necessary in such cases to form an estimate of the length of time for which the loss of earnings will continue, and capitalise this amount with a due allowance for contingencies, such as the possibility of future illness or accident.

Account must be taken of any probability that the plaintiff's earnings would in due course have increased. There is no inflexible rule as to the manner in which the estimate must be made.

2.17 Rights of action on death are explained in the standard text-books on the Law of Tort. At common law, the situation is governed by the maximum **Actio personalis moritur cum persona** under which an action for personal injuries died with the injured man. But the dependents in their own right could only sue for the financial loss which they had sustained by reason of the death, such as the fact they could no longer look to the deceased to maintain them. Such claims have largely been found on loss of expectation of life.

2.18 As regards the evaluation of disability in compensation for pneumoconiosis, the Committee is of the opinion that there is no problem of greater importance and more difficult of solution, in the field of occupational diseases, than the attempted evaluation of disability.

2.19 While the techniques for diagnosis of this condition have very much been improved little progress has been made in the establishment of some formula for evaluation of disability.

2.20 The Committee has unanimously agreed to lay down in detail some of the most important aspects of this problem of evaluation of disability and would like to express, without any hesitation, that it does not know all the answers to these questions. The Committee, has, however, agreed to review briefly, even at the expense of increasing the size of its report to the Government, some of the standard legislative provisions which have attempted to deal with these matters and to establish directives to administrative agencies in handling claims in separate sections that follow this introductory chapter.

2.21 Some of the questions which the Committee was faced with the evaluation of disability in a given employee who is exposed to the inhalation of dust and such inhalation has (it is assumed) caused pulmonary changes, were :

- (i) When does that condition become disabling within the concept of that term as referred to above ?
- (ii) When should the employee subject to exposure to harmful dust be removed from his employment ?
- (iii) When should such employee be deprived of his privilege of continuing at work in the occupation in which he may be engaged ?
- (iv) What methods are available to medical science to pronounce that the employee is totally disabled ?
- (v) What sequelae result from a diagnosis of partial disability ?
- (vi) Should the employee at that time terminate his employment ?
- (vii) Should he be paid "X" rupees and have that payment effect a release of continuing liability to his employer ?
- (viii) Should his ability to procure other employment free from dust-exposure deprive him of any continuing benefit under the compensation law ?
- (ix) What methods are available to our commissions and courts to properly evaluate disability free and clear of prejudiced medical

testimony that may be offered by the claimant ? by the employer ? or by the insurer ?

## 2.22 Compensation for partial disability.

The medical evaluation of partial disability, resulting from pneumoconiosis, differs materially from scheduled injuries presently compensable for loss or loss of use of other parts of the body, such as an arm, leg, hand, etc. No answer has been found to this problem. Of necessity, the attempted evaluation of a fixed percentage of disability is exceedingly complicated and unsatisfactory. Therefore, the employer and the insurer contend that compensation should not be paid unless the claimant has suffered wage loss, or that compensation, if any, payable for partial disability should affect the discharge of the employer's liability within a reasonable time after termination of employment.

Contra, the employee has, in fact received some injury from the inhalation of dust and development of demonstrable disease. Perhaps legislative provisions denying compensation for partial disability are not thoroughly satisfactory or fair to the parties concerned with the administration of laws. This type of legislative procedure needs the help of medical profession to approve of some method of evaluating partial disability.

## 2.23. Compensation for total disability.

The Committee is of the view that the propriety of paying compensation for total disability for pneumoconiosis cannot be denied. However, what do we mean by total disability ? Total disability may mean one of several following things :—

- (i) The inability to earn any wages in the employment where last employed.

Under this concept complete loss of wage is a condition precedent to an award of compensation.

- (ii) The inability to perform any further work in the occupation in which the employee was engaged.

Under this concept, the employee must be able to perform any further work in another occupation. The administrative agencies adopt an opinion that continuing exposure is hazardous and detrimental to the claimant and, therefore, compensation for total disability should be awarded even though the claimant is able to make as much, and in some cases more, in other employment.

- (iii) The inability to earn equal wages in other suitable employment.

In this class, the right to recover compensation is dependent upon proof that the claimant has been incapacitated from earning equal wages in other suitable employment.

2.24 These phases thus enter into the determination of what is and what is not a compensable claim and represent the problems for the compensation authorities in disposing of claims presented by these diseases.

2.25 Attempts must be made for the proper compensation of partial disability with termination of continuing liability of the employer.

## 2.26 Limitation provisions

The Committee after exhaustive study of this aspect of the subject wishes to record that this is a major problem and one which presents the opportunity for extended and time-consuming discussion.

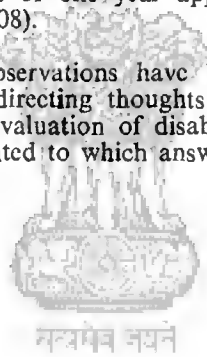
Both the employer and the insurer desire the termination of the liability within a reasonable period of time after employment has ceased. (\*)

The employee on the other hand feels that he is entitled to compensation beginning at any future time when the disease becomes demonstrable or disabling irrespective of the date of termination of his employment.

From the standpoint of legislation, however, the Committee feels unable to answer this problem, beyond laying down certain provisions in other labour laws of the land.

- (i) The general limitation period for actions of tort is six years from the date when the cause of action accrued: (Limitation Act).
- (ii) A limitation period of one year applies to claims under Indian Limitation Act (1908).

2.27 The foregoing observations have been presented by the Committee for the purpose of directing thoughts to those questions, medical and legal, involved in the evaluation of disability. The various, if not all, legal issues have been presented to which answers are difficult to find.




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\*In India there is a statute corresponding to Employer's Liability Act.

## CHAPTER 3

### **Administrative implications in the working of the laws pertaining to occupational diseases in accordance with Workmen's Compensation Amendment Act, 1959.**

3.1 Consequent on the enactment of the Employees' State Insurance Act, 1948, a number of administrative and procedural problems must be clearly stated in so far as this subject of pneumoconiosis is concerned.

3.2 The Committee wishes to draw the attention of the Government to certain peculiarities in the Workmen's Compensation and Employees State Insurance legislation, which it has found and which are likely to bring about extended discussion and difficulties in the administration of the laws pertaining to dust diseases which are laid down hereafter. These peculiarities are :

- (1) Under Workmen's Compensation Act the employer is liable for the entire cost of compensation. But under the Employees' State Insurance Act (which provides for the compulsory insurance of a specified, class of wage earners against the risks of sickness, maternity and employment injury) the responsibility of paying the compensation is that of the Employees' State Insurance Corporation.
- (2) The Workmen's Compensation Act applies to workers specified in Schedule II to the Act, and all railway servants; these include persons employed in factories (not covered by the Employees' State Insurance Act) mines, plantations, works of construction etc.

The Employees' State Insurance Act, applies to all factories other than seasonal factories, but may be extended (in the future) to other classes of establishments.

- (3) Under Workmen's Compensation Act, compensation for death and permanent disablement consists of the payment of a lump sum varying with the monthly wages of the workmen concerned. For permanent partial disablement, the compensation consists of a fixed percentage of the amount payable for total disablement; and for temporary incapacity the compensation consists of half monthly payments.

Under Employees' State, Insurance Act disablement and dependents' benefits are payable at weekly rates prescribed in the Act, in lieu of compensation or damages to which the worker is at present entitled under the Workmen's Compensation Act.

- (4) The Workmen's Compensation Act is administered on a State basis by the Commissioners for Workmen's Compensation.

While disputes and claims arising under the Employees' State Insurance Act are decided by Employees' Insurance Courts set up by the State Governments.

- (5) The benefit provisions (pensions admissible) of the Employees State Insurance Act are more generous and liberal, and previous

to this enactment, all workers were identically treated under the Workmen's Compensation Act.

This might cause hardship both to the employers and the employees who come under the purview of the Workmen's compensation Act.

- (6) The present system of lump-sum payments in case of permanent disability or death and periodical payments in case of temporary disability under Workmen's Compensation Act will have to be converted into a system of periodic pensionary payments to fall in line with the system under the Employees' State Insurance Act.
- (7) The liability for benefits under the Employees' State Insurance Act is on a National organisation while under the Workmen's Compensation Act it is on the employers.
- (8) Many cases of compensation under the Workmen's Compensation Act have gone by default as the law requires a claim to be lodged before the Court which workers or their families often fail to do so due to ignorance, and this the Committee apprehends, is very likely to happen in most cases of diseases scheduled in Part C of Schedule III of the Workmen's Compensation Amendment Act 1959.
- (9) In factories to which all provisions of the Employees' State Insurance Act apply, the provisions of the Workmen's Compensation Act are replaced by the more progressive measures of the Employees' State Insurance Act.
- (10) Claims against employers under the Workmen's Compensation Act lead to contentions.
- (11) Many employers never take a Workmen's Compensation insurance policy.

3.3 In view of the above peculiarities and difference in the administration and dispensation of social security under the two most advanced statutes the Committee decided to examine the experience of the Workmen's Compensation authorities and the Employees State Insurance authorities in relation to compensation in cases of occupational diseases, other than pneumoconiosis which are compensable since 1948, *i.e.*, the year of enactment of Factories Act and Employees' State Insurance Act.

3.4 The Committee would like to present below the existing statutes of compensation for occupational diseases :

- (1) Information regarding the incidence of these diseases is at present obtained under the Workmen's Compensation Act 1923, the Factories Act 1948, and the Mines Act 1952.
- (2) Recently some of the States have notified certain diseases as also occupational diseases under the Workmen's Compensation Act *e.g.*, Silicosis as in Andhra, Bihar, Madras, Madhya Pradesh, Rajasthan and have also framed Silicosis Rules.
- (3) The Mysore silicosis Rules S(1940) (Annexure 'B') were framed under section 31 (1) of Workmen's Compensation Act, XIV of 1928. These

apply to all industries specified in Schedule "A" of these rules give below.

**Industries involving exposure to the risk of silicosis:**

1. Mining-gold.
  2. Porcelain and Pottery industries.
  3. Cement industry.
  4. Glass industry.
  5. China clay and tile industries.
  6. Sandstone industry.
  7. Quarrying or crushing or cutting of stones.
  8. Manufacture of bricks & tiles.
  9. Foundries and metal works.
- (4) Even under Mysore Silicosis Rules (1940) cases of silicosis in gold mining industry only have been compensated and no case of silicosis from any of the other scheduled industries, has ever been reported to have been paid compensation.
- (5) The following table gives data on cases of silicosis from Kolar Gold Fields (data collected from the Indian Labour Year Books from 1946 onwards) :

**Cases of silicosis from Kolar Gold Fields and Compensation paid under.  
Mysore Silicosis Rules (Jan. 1940)**

**TABLE III**

Year	No. of cases	Deaths	Amount for death Rupees.	Permanent disability cases.	Amount for permanent disability Rupees.	Amount of compensation Rupees.
1940-41	402					231,822
42	644					245,993
43	778					392,590
	L.Y. Book 46					
1945	618		47	48		255,750
1946	230		48	49		148,082
1947-48	162	2	2,850	160	122,626	131,326
1949-50	130	4	49	50	134,363	135,463
1950-51	133	5	10,100	126	142,058	155,958
1951-52	90	9	13,900	128	134,624	159,224
1952-53	256	14	24,600	81	@348,154	388,754
1953-54	824	3	40,600	242	*801,914	809,314
1954-55	237	2	7,400	821	315,708	321,108
1955-56	328	4	5,400	235	392,686	404,486
			11,800	324		
Total	4,832	43	116,650	2,117	2,392,133	3,779,870

@Represents 51 % of total compensation paid under Workmen's Compensation Act during the year.

†Represents 86% of total compensation paid under Workmen's Compensation Act during the year

(6) So far as is known no case of silicosis has received compensation under Workmen's Compensation Act in any other State in India.

3.5 The Committee would like to present below certain data collected from various sources regarding the incidence of silicosis in various industries which have been surveyed during the last seven years by various Governmental agencies.

TABLE IV

## Incidence of silicosis in Indian Industries.

(Data from Reports of Chief Adviser Factories)

Occupations and industries	Workers X-rayed	Cases of silicosis	
		No.	%
Supervisory staff in Mica Mines	42	19	45.2
Mica Mining in Bihar	329	112	34.1
Hand driller in Mica Mines	62	17	27.4
Metal Grinding	44	12	27.2
Fire clay & Silica Brick making	327	69	21.1
Pottery & Ceramics industry	808	127	15.7
Total	1,612	356	22.0

3.6 The data on the incidence of pneumoconiosis of coal miners are very meagre. In a study carried out under the aegis of Indian Council of Medical Research there were reported 41 cases of pneumoconiosis amongst 259 coal miners X-rayed (i.e., 15%) (\*)

3.7 As regards the disease BAGASSOSIS the Committee after exhaustive search of Indian Literature found one report in which 9 cases of bagassosis were reported from amongst 200 workers in a paper mill. (\*\*)

3.8 No case of asbestosis has ever been reported in Indian literature.

(\*) Unpublished I.C.M.R. Annual Meeting 1958. Agenda item No. 3.

(\*\*) Singh J.N. Bagassosis, J. Indian. Med. Ass, Sept 16, V. 25, No. 8, 304-6.



## CHAPTER 4

### **The Radiological Diagnosis of Silicosis Pneumoconiosis. etc.**

4.1 The Committee is of the opinion that the radiological diagnosis of disability may be a comparatively easy matter if all the relevant facts pertaining to the disease are known.

4.2 The Committee is also of the opinion that the diagnosis of pneumoconiosis must be based not only on the radiological evidence but also on a comprehensive knowledge of all the factors that may contribute to the development of the disease. The diagnosis may be accepted unquestionably if by means of periodical examinations there is also a full clinical and radiological picture of the individual over the years. In cases of claims in fatal cases post-mortem evidence of pathological changes in the lungs due to inhalation of dust would be required.

4.3 The Committee would also like to record, for the guidance of various bodies concerned the fact that difficulty in the diagnosis of silicosis most often will arise in the type of cases where :—

- (i) an individual is seen for the first time;
- (ii) his period of service in a dusty occupation is not accurately known;
- (iii) there is lack of knowledge of factors commonly associated with the pneumoconiosis hazard such as dust concentration data; geological data; general preventive measures against the hazards; the type of mining practised, etc.

In an investigation in doubtful fatal cases even all this information may not be sufficient and the final criterion may have to be post-mortem findings.

4.4 The Committee is also of the opinion that X-ray findings over a period during periodical medical examinations are of great importance in making definite diagnosis in cases where doubt exists.

4.5 The Committee would also like to emphasise that legally, and also for the purpose of establishing a development ratio, it is important to diagnose radiologically the earliest detectable signs of pneumoconiosis—silicosis, etc. which is often a very difficult matter.

4.6 The Committee would also like to stress a most important factor in the radiological diagnosis of any chest disease, that is the ability to interpret X-ray films. This is not only a matter of aptitude but will entail extensive study of normal plates and their variations.

4.7 The Committee is of the opinion that in all radiological work a standard X-ray technique must be laid down by administrative instructions to get skiagrams which would be accepted by Pneumoconiosis Councils and Boards.

4.8 The Committee recommends the adoption of the standard set down by the I.L.O. as far as possible which is given in Annexure 'C'.

4.9 The Committee recommends that every effort should be made by the Government to disseminate the I.L.O. standard (Classification of the Radiographs of the Pneumoconiosis) accompanied by a set of reproductions of the standard radiographs to the State Governments, hospitals, physicians and radiologists, Pneumoconiosis Advisory Councils, Pneumoconiosis Medical Boards, etc.

4.10 The Committee would also like to impress on the fact that any question on the differential diagnosis of opacities in the lung immediately opens up a wide field for discussion. The presence of any opacities should be viewed in the light of its possible relationship to silicosis, coal miner's pneumoconiosis and tuberculosis.

4.11 The Committee would, from the evidence that it has at its disposal, like to state in very clear terms, the fact that there exists in cases of silicosis etc. and in those who have been exposed to harmful dusts a potential predisposition to the development of tuberculosis, and that such an infection may become modified by the formation of an excessive fibrosis.

4.12 The Committee would like to lay emphasis again on the following **pre-requisites for the radiological diagnosis of silicosis/pneumoconiosis.**

- (a) a comprehensive knowledge of all the factors, clinical and industrial, that may contribute to the development of the disease;
- (b) a thorough knowledge of the correlation of X-ray findings with the nature of the hazardous dust;
- (c) the necessity of serial X-ray films over a period.
- (d) the correct interpretation of the X-ray films with discussion on the nomenclature or classification evolved by the I.L.O.;
- (e) the necessity for adoption of the standard X-ray techniques as laid down in the I.L.O. Document;
- (f) the use of standard radiographs (I.L.O.) in the interpretation of X-ray pictures;
- (g) the importance of correlating the clinical findings with the radiological evidence. This must be done by the clinical examiner;
- (h) silicosis by itself is not very often a disabling disease;
- (i) disability is more reliably estimated by direct clinical examination than by the use of instruments.

4.13 Regarding **differential diagnosis**, the Committee would like to lay down the following conditions which may be considered:

- (i) welder's lung;
- (ii) metal grinder's lung;
- (iii) mitral stenosis;
- (iv) cardiac disease; (cor pulmonale)
- (v) miliary tuberculosis;
- (vi) tin miners' pneumoconiosis;
- (vii) miliary carcinomatosis;
- (viii) siderosis;
- (ix) tropical eosinophilia.

Tuberculo-Silicosis (infective silicosis) must be differentiated from the following conditions :—

- (1) Anthraco—Silicosis ;
- (2) Tuberculosis without Silicosis ;
- (3) Silicotic Conglomerate mass ;
- (4) Thickened pleura ;
- (5) Actinomycosis ;
- (6) Fungoid infections,
- (7) Unresolved pneumonia ;
- (8) Enlarged root and mediastinal glands ;
- (9) Primary Carcinoma ;
- (10) Sarcoid disease ;
- (11) Hydatid disease ;
- (12) Leukaemia ;
- (13) Hodgkins disease.

4.14 The X-ray picture is not diagnostic of the presence or extent of disability, and disability cannot be related to the extent of the radiological changes present.

4.15 A considerable time is usually required for the evolution of the characteristic X-ray picture.

4.16 In cases of tubercular complications, the signs of such infection are superimposed upon those of simple pneumoconiosis.

4.17 The Committee is of the opinion that, while the classification of radiographs set down by I.L.O. constitutes an interesting and useful guide for the diagnosis of pneumoconiosis and the appraisal of its gravity, it is another matter to ascertain at what stage workers so afflicted should be removed from the dangerous occupation. However, the Committee is of the opinion that where radiological diagnosis of Pneumoconiosis/Silicosis has been established, the worker should no longer be employed in any dusty occupation and he be advised a change of occupation free from the hazard of dust. The Committee has nothing to say further in this subject. This silence of the Committee is not due to an oversight; it stamps from the deliberate intention not to state an official attitude on the subject.

4.18 The Committee would like to emphasise that special radiological characteristics of pneumoconiosis account for the extreme diversity radiological pictures which they produce as well as the irregularity of their progress which is found in practice to obey no specific law.

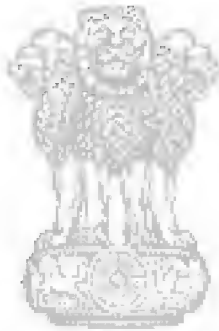
4.19 The Committee feels that it would be more realistic in the circumstances simply to trust the examining physicians, in the knowledge that their experience and their sense of responsibility would enable them to reconcile the medical grounds in each case with the various social claims.

4.20 The Committee is fully confident that the members of the medical profession, thus informed, will accord it their devoted cooperation in the complete, rational and reasonable administration of the Occupational Diseases

Compensation Law, the significance and the vast social import of twchich they are also assuredly aware.

4.21 The Committee after exhaustive consultation of the literature on development of pncumoconiosis is of the following opinion ;

- (i) The disease-processes in pneumoconiosis show two radiologically and pathologically distinguishable pictures; simple pneumoconiosis due to action of dust alone, and complicated pneumoconiosis or progressive massive fibrosis (P.M.F.) probably due to tuberculous infection modified by simple pneumoconiosis.
- (ii) While simple pneumoconiosis may produce moderate disability complicated pneumoconiosis or progressive massive fibrosis is the chief cause of disability and death from pneumoconiosis.
- (iii) Simple pneumoconiosis is itself non-progressive in the absence of continued dust-exposure.



## CHAPTER 5

### Assessment of Functional Capacity in Pneumoconioses

5.1 The Committee would like to emphasise a common observation in pneumoconiosis that there is often a considerable disproportion between the roentgenologic changes and the patient's subjective symptoms.

5.2 The Committee also feels that owing to the great insurance interests in connection with these diseases, it is, therefore, important to establish whether functional examination of the lungs can supply both a fairly objective, numerical expression of the existing decrease of function and an estimate as to whether there is likely, an organic basis of the patient's symptoms.

5.3 The Committee would like to point out that the methods used in clinical work to estimate the function of the lungs vary a good deal from one hospital to another. Also they are not in general use in any hospital in India. This aspect of pulmonary physiology has been very much neglected and only a stray research worker is engaged on this subject.

5.4 The Committee would also like to emphasise the fact that physicians are required to reach a decision regarding two questions:-

- (a) Has the claimant suffered an injury due to his occupation which has impaired the physiologic function of the respiratory and circulatory apparatus to a degree that renders him incapable of earning wages under the circumstances stipulated by law ?
- (b) Is the injury and the consequent physiologic deterioration due wholly or in part to an occupational disease resulting in loss of earning capacity ?

The methods whereby such appraisals can be accomplished are still obscure, rare, difficult to perform, and for which no facilities exist except in a handful of places or research institutes. These physiological methods are highly technical and laborious and require trained physicians who are not available in the country.

5.5 The Committee after full appreciation of the actual limits of the physicians' ability to recognise and quantitate the existing degree of cardio-respiratory dysfunction is obliged to refrain from laying down (prescribing) the manner in which and the standard by which incapacity may be assessed.

5.6 The Committee however, thought it fit to give in brief an idea of the implications, requirements of technical knowledge and laboratory facilities and finally of the type of personnel needed to evaluate the incapacity.

- (a) The various aspects of pulmonary function that require to be evaluated are ):-

Ventilation (Lung Volume)  
Alveolar function

Mass movement of air

{ Air Distribution  
Membrane Diffusion  
Capillary perfusion

Pulmonary blood flow, right ventricle

Volume flow, pressure

- (b) The methods of measurement of pulmonary ventilation, of alveolar function and quantitative measurements of the pulmonary circulation require trained research teams, technicians, equipment and laboratories (a number of them ) before this can be done.
- (c) An accurate evaluation of pulmonary function impairment can be made from the following physiological tests:-
  - (1) Ventilation measurements from Spirogram tracings (total vital capacity, 3 second vital capacity, maximum breathing capacity and the shape of the exhalation curve following a deep breath).
  - (2) the degree of bronchospasm present;
  - (3) the residual volume and aveolar nitrogen percentage;
  - (4) arterial blood-oxygen saturation at rest and after exercise;
  - (5) oxygen uptake during exercise;
  - (6) percentage of oxygen extracted from the inspired air breathed;
  - (7) the character and duration of dyspnoea after exercise;
  - (8) a numerical ventilation factor derived from (1) and (3).
- (d) Based on the above data evaluation standards for these physiological tests can be made out that would be most useful in pulmonary function evaluation.
- (e) The degrees of pulmonary function impairment based on these or other tests may be classified as:—
  - slight;
  - moderate;
  - advanced;
  - far advanced.
- (f) By combining chemical, radiological and functional examinations it is possible to obtain a general picture of the effect of silicotic /pneumoconiotic lesions on the cardio-respiratory physiology.

### 5.7 Grading of Silicosis

The Committee has, for the guidance of persons concerned, also given in, Annexure (D) the American Method of "Grading of Silicosis."

## CHAPTER 6

### The evaluation of disability/invalidity in Pneumoconioses.

6.1 The Committee has found considerable differences between the legislative texts and regulations of different countries, concerning both the definition of invalidity and the methods of evaluation of the degree of incapacity for work. But the meaning given to these terms is, in general, quite similar in different countries, and the methods of evaluation of invalidity are governed much more by similar problems and difficulties in each country than any fundamental divergence.

6.2 The Committee was compelled to devote a major part of its time to problems connected with this subject owing to the complexity of this technical problem.

6.3 The Committee studied at great length the methods of evaluation of invalidity, used in the various countries, in line with the criteria of incapacity adopted by the different legislations, *i.e.* physical incapacity, incapacity or employment, occupational incapacity or loss of earning capacity.

#### 6.4 Incapacity for work.

"Incapacity for work" (which is in principle always temporary) indicates either interruptions of employment of shorter duration, or the initial period of a reduction in earning capacity which may possibly be prolonged beyond this period in the form of invalidity.

**Incapacity** is a condition of ill-health due to "some specific disease or loss of faculty physical (body) or mental", which renders a person unable to follow his ordinary occupation or if an attempt to work is made, would seriously prejudice his health. This condition implies that he will soon be able to resume his occupation.

#### 6.5 Invalidity

"Invalidity" has a more permanent character and extends from long duration illness upto invalidity affording entitlement to some kind of benefits—fortnightly allowances, pensions or lump-sum payments. It indicates the state of persons subject to, or having been subject to, reduction of earning capacity in varying degrees, during relatively long periods or permanently.

**Invalidity** is a condition which may arise either at once as in some cases of accident or later in the course of prolonged illness and implies that the person becomes permanently incapable of following his ordinary occupation.

6.6 As far as distinction between "temporary" and "permanent" in capacity (disablement) is concerned the Committee would like to draw attention to one peculiar feature of permanent incapacity, especially in most dust diseases of the lungs complicated with tuberculosis, namely that it is **necessarily of a final character**. The expression "permanent incapacity" covers sickness and invalidity of long duration not likely to be cured within a brief

period, and more often than not is absolute invalidity with its corollary implication of a chronic state with a short or long-term fatal prognosis. This view of the Committee is based on the various reports of environmental hygiene and medical surveys published by the Chief Adviser Factories Organisation of the Ministry of Labour & Employment and a number of papers published in the country regarding these diseases. "Permanent Incapacity" does not necessarily imply that the incapacity is chronic and irremediable.

6.7 It follows then that the evolution of incapacity is not purely a medical problem, but other experts and finally the administrative authority must make the decision.

6.8 It also follows that individual factors and complaints must be taken into account as they result in different degrees of incapacity according to the occupational activity considered.

6.9 It also follows that individual differences and special features in each case would render the use of "invalidity scales" useless as far as occupational dust diseases are concerned.

6.10 The entitlement to benefits in temporary incapacity is only when it is total. In such cases the usual occupation of the beneficiary is taken into account in evaluating it. This is so because of the nature of the cause of incapacity, its uncertainty at the outset, and the limitation of its period. The determining factor in the period of temporary incapacity is the actual gravity of the complaints or the need for intensive treatment, rather than the earning capacity which can be maintained.

6.11 The certification and description of complaints which justify incapacity for work in all cases is done by doctors.

6.12 While the medical opinion constitutes the determining factor (without reference to the economic point of view), the final decision is given by the administrative bodies.

### **6.13 Degree of invalidity and degree of reduction of earning capacity.**

The degree of physical or physiological incapacity is evaluated by doctors and then translated into economic terms and expressed as a percentage reduction of earning capacity taking into account factors which are not strictly medical. Thus there is a double aspect of the evaluation of incapacity affording entitlement to benefit.

6.14 There is however, not necessarily any proportionate relationship between, on the one hand, the degree of incapacity for work from the medical angle consequent on organic or functional disease to the physical and/or physiological complex of the human body, and, on the other hand, the degree of residual earning capacity consistent with the disease.

6.15 The degree of incapacity for work is deducible from the clinical pathological, radiological, etc. examinations which assess the sum total of the disease or injury resulting from the morbid factors causing this incapacity or work.



### 6.16 Minimum incapacity for work required by legislation for entitlement to benefit.

This varies from country to country, but the introduction of a minimum has the effect of excluding from benefit losses of capacity which are only slight. This is done to ensure means of livelihood to persons who can no longer acquire them by personal labour.

In occupational disease legislation compensation is generally provided for injury in relation to its duration, irrespective of its gravity.

For temporary incapacity no minimum incapacity is required for entitlement to benefit. The incapacity must usually be considered total in the sense that it prevents the normal exercise of the usual occupation.

For permanent incapacity, the minimum reduction of earning capacity should not be less than 20 percent. The Mysore Silicosis Rules (1940) describe the nature of injury, disability (partial and total) and the amount of disablement. This is given in Schedule I of Sec. 2(1) and (4) of Mysore Workmen's Compensation Act, 1928.

SCHEDULE I	
Injury	Percentage of loss of earning capacity
Silicosis in the Antiprimary stage	20 percent.
" Primary stage	30 percent.
" Secondary stage	100 percent

### 6.17 Invalidity scales.

In the opinion of the Committee it is difficult, if not impossible, to find a co-efficient which expresses the relationship of each physiological function of a normal human being. Also a number of symptoms and subjective disorders in these diseases cannot be expressed in definite terms. The means for testing functional capacity are either not available or themselves lack precision and are not applicable to the total of "syndromes" offered by cases of pneumoconioses. Thus it is difficult to evaluate the physical, physiological or functional invalidity for the innumerable complaints and functional disorders in individual cases of pneumoconioses.

6.18 With these occupational diseases, the effect on capacity for work is more difficult to assess.

So also the extent of the lesions and disorders in pneumoconioses do not permit of any systematic and rigorous use of any kind of tables for assessing the degree of incapacity.

6.19 The Committee has known of many cases of miners who are shown by the radiographic examination to have silicotic lesions over the whole of twolungs, while functionally they show no disorders, nor are subject to fatigue

nor show any dyspnoea of effort, nor palpitation and consequently maintain a total capacity for work.

On the other hand there are cases (which the Committee members have come across) which under the same working conditions show functional disorders and total unfitness for occupation, while all the examinations and tests give a negative result.

While organic lesions constitute the first decisive factor in determining incapacity for work, functional and subjective disorders must have a large place in the evaluation of disability.

6.20 The extent of the disablement on which benefit should depend has been very carefully studied by the Committee and it is of the opinion that the basis of the **assessment should be the condition of the workmen as compared with another person of the same age and sex whose physical and mental condition is normal.**

6.21 The Committee would also like to emphasise that the Medical Boards must be advised and instructed to have regard to the condition of the workman at the date of the assessment and what he may be expected to suffer as the result of the condition found. Thus the law should award disablement benefit not for an accident or disease but for **employment injury by accident or disease** arising out of and in the course of employment. In other words compensation should be payable not when or because a workman has contracted a disease, but when or because he has suffered disablement or potential disablement or loss of reserve power of the lung. The percentage of disability is always designed in terms of the body as a whole and never as a percentage loss of individual organs.

6.22 The term "disablement" the Committee would like to give the widest possible meaning, embracing all handicaps (physical and mental) in carrying on the normal activities of life.

6.23 The Committee would like to point out in detail the various injuries caused by pneumoconioses for the knowledge of people concerned with the administration of these laws.

The injuries caused by pneumoconioses result in :—

- (i) Loss of resiliency of lung parenchyma ;
- (ii) Loss of elasticity of the pleurae ;
- (iii) Bronchial spasm ;
- (iv) Loss of power of respiratory muscles ;
- (v) Affecting the maximum capacity for moving air through the lungs ;
- (vi) Interference with proper distribution of air throughout the lung with the normal rate of gas diffusion across the membranes ;
- (vii) Disruption of some or all factors in respiration, leading to :—
- (viii) anoxia which produces the symptom,
- (ix) dyspnoea or breathlessness, or air hunger, or asthma.

6.24 The Committee is of the opinion that the assessment of disablement is the assessment of dyspnoea during his normal work.

6.25 The Committee is also of the opinion that the assessment of dyspnoea, like the diagnosis question, is a consultative opinion.

6.26 The Committee would also like to emphasise that on the medical side the determination of entitlement for benefit in individual cases hinges largely on the report of the **periodical medical examination**.

6.27 The Committee considers that this periodical medical examination of the workmen (especially miners) is primarily by X-ray examination of the chest.

6.28 The Committee would also like to emphasise the fact that each industry, in which pneumoconiotic conditions are produced in the workers, will have to determine its own clinical and radiological standards for compensation.

6.29 The Committee has carefully considered the many factors which make so difficult the determination of disability as a result of pneumoconiosis and would like to lay down the possible categories into one of which all those examined must be placed if medical examinations for assessment are made. (\*)

- (1) No physical or radiological abnormality and considered fit for work;
- (2) Active pulmonary tuberculosis, either uncomplicated or associated with a pneumoconiosis.
- (3) Advanced pneumoconiosis resulting in considerable disability for any form of labouring work.
- (4) Simple pneumoconiosis, radiologically diagnosed due to inhalation of dust in the employment, with little or no disability for labouring work.
- (5) Condition not associated with pneumoconiotic changes, but incapacitating to a considerable degree for work,
  - (a) the disabling condition, having been caused, contributed to or accelerated by employment
  - (b) the disabling condition *not* having been caused, contributed to or accelerated by employment.
- (6) Condition not associated with pneumoconiotic changes but with little or no disability for work,
  - (a) the disabling condition, having been caused, contributed to or accelerated by employment,
  - (b) the disabling condition *not* having been caused, contributed to or accelerated by employment.
- (7) A condition due to employment with considerable disability for work resulting from this. In addition, presence of pneumoconiotic changes considered not, or only slightly, disabling.

6.30 As groups 5 & 6 do not form the subject matter of this report the Committee has not considered them, but the Committee would like to state that the other groups must be considered in the determination of dis-

(\*)— GEORGE W.E. Determination of Disability and Standards of Compensation in Pneumoconiosis. I.L.O. Record of Proceedings of Third International Conference of Experts on Pneumoconiosis, Vol. II, p. 278—(adapted form),

ability and the defining of standards for the compensation of pneumoconiotics since each of these groups presents its own compensation problem.

6.31 In view of the above considerations the Committee is of the opinion that the **medical certificate** issued by the authorities should indicate, for the guidance of administrative officers, the incapacity of the worker as a whole and the causes of this incapacity.

6.32 In the opinion of the Committee the medical certificate issued by the medical authority must certify the following four conditions :

- (a) ".....is suffering from pneumoconiosis/or pneumoconiosis with tuberculosis and his condition is reasonably attributable to his employment in ....."
- (b) ".....is fit for .....". (here certify as to his fitness for work, specifying where necessary the kind of employment for which he is fit).
- (c) "The general physical capacity of.....for employment is impaired by pneumoconiosis or pneumoconiosis with tuberculosis to the extent of.....per cent."
- (d) This certificate is issued for a period of....."

6.33 The Committee is of the opinion that with such a certificate the administrative authority for compensation will have a complete picture of the physical condition of the worker.

#### 6.34 Other considerations

The Committee, however, would like to state that unless **vocational rehabilitation services** supply the indispensable economic corrective, there will be a constant increase in the number of invalids who, even if they have overcome their complaints, as they grow old while still partially incapacitated, will increase and prolong the burden of invalidity.

6.35 The Committee, as such is in favour of providing schemes for a **revision of the degree of invalidity**.

6.36. In the evaluation of invalidity for these occupational diseases, it will be necessary not only to determine the absolute measure of the physical or physiological injury but mostly to measure the repercussions of these injuries on the possibilities of employment and on the earning capacity resulting therefrom since compensation aims at guaranteeing the means of existence for the diminution in earning capacity, rather than absolute reparation for physical or physiological injuries.

6.37 The Committee feels that such a concept would help in the individualisation of every case, as this would facilitate earmarking a different degree of invalidity to persons suffering from the same injury (occupational disease), but who on account of differences in age, vocational training, possibilities of employment, possess a quite different earning capacity.

6.38 This concept means that besides medical examination reports important place must be given to investigations of an economic type carried out by experts on wage-scales, the employment market, and the **vocational rehabilitation programmes**.

6.39 In view of the above, the Committee feels that invalidity tables have no function in respect of occupational disease invalidity as they cannot fix the degree of invalidity. Furthermore, in most cases evaluation is based not on radiological diagnosis alone but also on subjective signs and symptoms, or functional troubles which are difficult to substantiate objectively by any methods of medical investigations.

6.40 In evaluation of invalidity the final decisions should belong to the administrative authority, as the general trend is to consider the reduction in earning capacity and not merely the intrinsic degree of injury in relation to physical or physiological integrity.

6.41 With regard to the occupational activities which may be taken into account in calculating the residual earning capacity the Committee would like to make a passing reference only. These activities may be one of the following 3 groups :

- (i) the habitual occupation of the person—for most cases of temporary incapacity.
- (ii) All occupational activities technically and socially connected to the habitual occupation, *i.e.* consideration of his occupational potential to a large number of activities comparable with his physical potential.
- (iii) All employments available on the general labour market.

6.42 The Committee desires to express that after having made this inventory it might continue with a more detailed study of the terms of reference to the Committee. Such a study would allow the Recommendations of the Technical Committee appointed in 1955 ( to suggest modifications in the Occupational Diseases in Schedule III to the Workmen's Compensation Act, 1923), and those now submitted on the Workmen's Compensation (Amendment) Act 1959—Rules under Section 16, to be brought into line.

नमो भगवते वासुदेवाय

## CHAPTER 7

### Qualifying Period

*Note :* The statute must be liberally constructed and that even though the statute may require three or five or seven years of aggregate exposure, it is not necessary to show that the employee was actually exposed to a silica hazard for three or five or seven 365-day years, but it is the actuality, regularity and continuity of the exposure which imports the employer's liberty, not the number of hours or days so worked.

7.1 The Committee is of the opinion that apart from the requirement regarding past employment in specified industries, or occupations as defined in part C to Schedule III of Workmen's Compensation Amendment Act 1959, the laws should specify certain conditions which victims of pneumoconiosis must meet before qualifying for benefit.

7.2 The Committee considers that this subject should be considered from four different aspects :

- (i) minimum duration of prescribed employment ;
- (ii) location of qualifying employment and residence requirements ;
- (iii) time lapse of qualifying employment ;
- (vi) other conditions.

7.3 As regards **minimum duration of qualifying employment**, the Committee is of the view that laws should make special provisions fixing a minimum length of time during which workers must have been engaged in certain prescribed employments or exposed to specific risks in order to qualify for benefits in case of pneumoconiosis.

7.4 The Committee is aware of the following recommendation of the Technical Committee appointed in 1955 to suggest modifications in the list of Occupational Diseases as regards the minimum qualifying periods :

- 3 years in case of Asbestosis
- 3 years in case of Bagassosis,
- 5 years in case of Silicosis,
- 7 years in case of Coal Miners pneumoconiosis.

7.5 The present Committee is of the opinion that the qualifying period suggested by the above Committee may be adopted with the following alteration in the time period and provisos :—

- (a) 3 years in case of all the 4 diseases mentioned above ;
- (b) compensation shall be payable for shorter periods of exposure only if there is "conclusive evidence" that disability or death was caused by the disease ;

- (i) that the victim suffers from the specific disease having a premature functional manifestation,
- (ii) that the case has been certified by a Pneumoconiosis Medical Board.

7.6 As regards the second aspect of the subject—the **location of qualifying employment**, the Committee, in view of the fact that inter-state migration of workers is quite common in India, and also the fact that the Workmen's Compensation Law and the Employees' State Insurance Law are both Central Acts, is not in favour of prescribing any limitation of the minimum period of exposure in employment to have been exclusively spent in any one particular state. While it is a fact that in nearly all of the State and Provincial Laws of the Federal countries (Australia, Canada and United States), the law requires that the prescribed periods of exposure in employment shall have been spent exclusively in the particular State.

The Committee also feels that it is perhaps implicit in the laws in this country that periods of qualifying employment must be served only within the geographical jurisdiction in India. Hence the Committee's decision.

7.7. In regard to the third aspect of the problem—the **time lapse of qualifying employment**—the Committee is of the opinion that the law must prescribe a limit upon the time which may elapse between the cessation of prescribed employment and incapacity or death so that where this period is exceeded compensation is not ordinarily payable. The Committee recommends that this period may be upto 4 years.

7.8 The Committee had to take into consideration a large number of factors governing any decision on this point like the illiteracy of the workers; their ignorance of compensation laws; the poverty of the people; the increase in the cost of living; the large number of dependents that most workers have; the chronicity of the disablement following these diseases; probable cases of compensated total disability arising after the enactment of the present laws; the difficulties in collecting proper evidence in proof of disability or death; and cases of uncomplicated pneumoconiosis, etc.

7.9 The Committee after detailed consideration of all these factors is of the opinion that the laws should state that

- (a) all claims must be filed within four years after leaving employment or cessation of exposure;
- (b) that the compensation authorities should be given the discretion to receive claims after the expiration of four years in cases of uncomplicated pneumoconiosis ;
- (c) the period of employer's liability should be extended to ten years for cases in which the existence of coal miner's pneumoconiosis or silicosis is certified between 21st July 1953 and 30th June, 1959 (21st July, 1953 when the diseases became notifiable under Mines Act, 1952, No. S.R.O. 1306 dated 21st July, 1952 in pursuance of powers contained under sub-Section (1) of Section 25 Notice of certain Diseases or such dates as notified by other State Govern-

ments (Andhra, Bihar\* Bombay,\*\* Rajasthan, Madras\*\*\*) and the exposure to risk had ended 4 years prior to the dates of such notification.

This provision, the Committee thinks, is the most important one and must be included in the statute in fairness to the workers who were diagnosed and notified, as cases of the disease prior to the enactment of the Workmen's Compensation Amendment Act, 1959, and rules there under.

- (d) For compensation to be payable disability or death must follow within four years after the last injurious exposure.

7.10 The Committee also discussed at great length the fourth aspect of the problem—other miscellaneous conditions—which should form part of any compensation law for these diseases. These are :

- (a) Should special benefit provisions apply to pneumoconiosis ?
- (b) Should compensation payable for total disablement or death resulting from pneumoconiosis be different as for employment injury generally :
- (c) Should increased benefits be payable if pneumoconiosis appears in conjunction with active lung tuberculosis so that the victim has to abandon employment irrespective of the degree of incapacity resulting from the pneumoconiosis ?

(It is important to remember here that under Employees' State Insurance Law extended medical benefits are provided to insured workers suffering from diseases like tuberculosis, cancer, leprosy, etc. for a period of one year. . . ) Such benefits are not available to other workers covered by Workmen's Compensation Law. In cases of pneumoconiosis complicated with tuberculosis, the loss of earning capacity should be considered as hundred percent.

- (d) Should benefit be accorded to worker suffering from pneumoconiosis to compensate for change of work or who is obliged to be withdrawn from employment in mines or change his employment in order to prevent aggravation of his condition but who does not prefix the conditions for receipt of a compensation ?

7.11 In regard to the points raised above the Committee is of the opinion that in any social security scheme these considerations must be accepted without any reservations and more so in our laws as our compensation laws do not have provisions respecting rehabilitation benefits or services for victims of pneumoconiosis.

7.12 The Committee recommends that the types and amounts of benefits or services to be made available to cases of pneumoconiosis should not be subject to the same restrictions as available to victims of employment injury or other occupational diseases. The laws should be benevolent enough to authorise somewhat divergent treatment for workers suffering from pneumoconiosis.

\*Bihar—Notification No. 11/W.4-107/50L-11145, dated July, 9, 1956.

\*\*Bombay— Notification No. 1422/48-1, dated 25th April, 1955.

\*\*\*Madras— Govt. of Madras No. 703-Development, dated 14th Feb 1953.



## CHAPTER 8

### **National Advisory Council on Industrial Pulmonary Diseases.**

8.1 The Committee is of the opinion that in extending compensation coverage to occupational chest diseases (coalminer's pneumoconiosis, silicosis, bagassosis and asbestosis,) it must be recognised that whatever method is pursued the subject is more complex than that of traumatic injuries or other compensable occupational diseases.

8.2 The Committee would like to emphasise that expert medical lead is essential in all aspects of the administration of Workmen's Compensation Pneumoconiosis Diseases Law.

8.3 The Committee is of the opinion that there is widespread pulmonary disease in men exposed to various kinds of harmful dusts not only in mining industry but factories industries and works of construction, tunnelling, dam making etc. The cases of dust diseases are not notified as the means and knowledge of diagnosis are not widespread and great areas of industry are not under such medical observation as would provide such information.

8.4 The Committee also feels that once Rules and Regulations for compensation for these diseases have been framed, there would very soon come a stage when there will be an increasing incidence of certification of disability since the population exposed to the risk of dust exposure is already big and this will go on increasing as the various Five-Year Plans are put into operation and employment opportunities increase *pari passu* with growth of industries.

### **8.5 Value of Pneumoconiosis Medical Boards in Administrative Agency.**

The need and value of Pneumoconiosis Medical Boards to assist the administrative agency in its determination of issues presented in claims has been recognised in all industrially advanced countries.

The need for Medical Boards is imperative :—

- (i) to evaluate the highly technical nature of the medical testimony presented on behalf of the claimant or the employer, and
- (ii) to act in an advisory capacity to the administrative agency.

The legislatures and commissions should not only recognise the need for such Boards but should accept and enforce their opinions in preference to the prejudicial opinions of witnesses testifying on behalf of litigants.

8.6 The Committee is of the opinion that the Government should administer the Pneumoconiosis Compensation Scheme through the following principal agencies :—

1. A National Pneumoconiosis Advisory Council.
2. Pneumoconiosis Boards for Industries.

**8.7 The functions of the National Advisory Council** should, in the opinion of the Committee be as follows :—

- (a) To make the necessary proposals to the government (Ministry of Labour) for implementing the Pneumoconiosis Compensation Scheme and carrying out the various stages.
- (b) To suggest in like manner any modifications or improvements of the general scheme of this compensation both in financial, medical, technical and rehabilitation aspects.
- (c) To make reports on proposals to include industries and operations in the scheme.
- (d) To prepare a catalogue of compulsory minimum preventive measures for industries involving risk of pulmonary diseases.
- (e) To determine administrative claims preceding and following petitions for review of compensation cases where pension for permanent incapacity or death due to pneumoconiosis is refused.
- (f) To be responsible for approving the organisation and development of administrative and Industrial Health Services to be established for the proper functioning of the compensation scheme.
- (g) To be responsible for development of research in the field of pneumoconiosis in all its aspects.
- (h) To supervise, guide and co-ordinate the working of various Pneumoconiosis Medical Boards and Pneumoconiosis Certifying Bodies (Centres).

**8.8 The functions of Pneumoconiosis Medical Boards** should be :

- (a) The Boards shall be responsible for the administrative management and conduct of medical examinations and shall propose such rules, additions and modifications to the National Advisory Council as they consider necessary for the proper execution of their duties.
- (b) They shall undertake preparatory work in matters which are to be the subject of reports or decision by the Advisory Council and shall carry out any tasks committed to it by the Advisory Council.
- (c) They shall carry out the certification of claimants for compensation.
- (d) The Boards may be constituted in the main hospitals in the areas affected where these cases are examined and treated for example Central Hospital, Asansol; Central Hospital, Dhandbad; Singraini Colliery Hospital in the mining industry and similar institutions in other industrial areas in the states.

**8.9** The Committee is not anxious to lay down the mode of constitution of the Advisory Council and the Boards at the present moment, though this subject was also tentatively discussed in the meetings of the Committee.

## CHAPTER 9

### Suggestions

9.1 The Committee strongly recommends that this report along with the report of the First Technical Committee (appointed in 1955 to suggest modifications in the list of Occupational Diseases in Schedule III to the Workmen's Compensation Act) be printed as companion volumes for the widest possible circulation for the use of legislators, commissions, medical committees, courts, Workmen's Compensation Commissioners, Employees' Insurance Courts in various states, industrial hygiene physicians, employers, mine Owners, railways, etc. who have the function of interpretation and administering Workmen's Compensation laws.

9.2 The question of determining the quantum (rate) of compensation payable should be remitted for consideration to an Actuarial committee and the Controller of Insurance might also be associated with the Committee. This committee might also consider payment of hardship allowance and supplementary benefits for worker's families in consultation with Mines' Welfare Fund authorities.

9.3 The Ministry of Labour should organise periodical conference of Workmen's Compensation Commissioners from various states, Representatives of E.S.I.C., Judges of Employees' Insurance courts to which are also invited industrial physicians, safety experts, rehabilitation employment officers, various Welfare Fund Commissioners, etc., for improving the knowledge on the subject.

9.4 The Ministry of Labour and Employment should issue document as a guide to the compensation of occupational diseases including dust diseases for the use of medical men, compensation authorities, inspectors, insurance carries, etc.

9.5 Legal provision should be made for compulsory "initial examination" for occupations where the risk of exposure to silicious dust is involved, with the purpose of discovering whether the worker is suffering from pneumoconiosis or tuberculosis or if he is in other specified respects unfit for the intended employment. This should include a radiological examination of lungs.

9.6 Legal provision must also be laid down for suspension from work of workers and their re-employment in scheduled industries and processes if they are suffering from tuberculosis, pneumoconiosis, rheumatic valvular heart disease or other heart diseases causing disability.

9.7 In case of **periodical medical examinations** and examinations for detection of pneumoconiosis, laws must be laid down for industries and occupations regarding the periodicity of such examinations. Examples are given below :—

TABLE V

## Suggested Frequency of Periodical medical Examinations

Industries and Occupations	Workers liable for examination	Periodicity of medical examination
Ceramic & tile factories	Workers exposed to dust with a silica hazard	First examination within 2 years of commencing work then regularly every 2 years.
— Factories manufacturing refractory articles	"	"
— Pottery factories	"	"
— Cleaning of castings by compressed air, hand jet or blasting machine.	"	"
— Sandblasting operations	"	"
— Chiselling and fettling by pneumatic chisel.	"	"
— Grinding or fettling by grindstone	"	"
— Dressing of grindstones	"	"
— Sand crushing	"	"
— Manufacture or cleaning products containing silica powder	"	"
— Open cast quartzite, sandstone schist, slab, quarries.	"	"
— Manufacture of asbestos materials	"	"
— Building or repair of furnaces made of fire-brick	"	"
— Mining (Coal mines) (Mica mines) (Other mines)	Workers habitually employed underground	"

9.8 The Government should lay down rules prohibiting employment of persons in a dust exposure occupation unless he is the holder of a certificate of fitness.

9.9 The Government should also lay down rules for medical examinations to be compulsorily made at the employer's expense and arranged for by him at the time of admission to employment and periodically thereafter in the manner and at the intervals prescribed by regulations.

9.10 The frequency of examinations and nature of investigations necessary for the giving of the certificates of fitness should be determined by the National Advisory Council on Industrial Pulmonary Diseases, taking into account the particular conditions in each occupation.

9.11 The Government should introduce a comprehensive medical scheme for the various factories and mining industries which carry a dust hazard for the purpose of medical examination of the workers and the investigation of their working conditions (new entrants and old workers) by establishing special bureaux, staffed with full-time medical officers and trained industrial hygienists.

9.12 The Government in all States, in industrial areas, should undertake long-term physiological, clinical and environmental studies (as in excessive humidity, rapid changes of temperature, fatigue, noise and vibration, poor lighting, poisonous gases, etc.) to develop practical methods for the measurement of the loss of function of the lungs as a result of fibrotic changes produced by the inhalation of dusts.

9.13 The Government should appoint **Dust Research Officers** to work in collaboration with medical bureaux for improving the present checking system and correlating dust conditions with the help of colliery employees.

9.14 The Committee likes to recommend to the Government, (when X-ray examinations and certification of new employees as fit for employment in dust exposure occupation become compulsory) to set up **Examining Centres** in the main mining areas and industrial areas under the various Welfare Fund Commissioners or other organisations for the examination of workers which examinations were previously conducted by mine and factory doctors.

9.15 The Committee also recommends that the following existing government departments must work in close collaboration to solve a large number of problems in connection with workmen's compensation for occupational diseases (Pneumoconiosis) :

1. The Ministry of Labour
  - Chief Inspector of Mines.
  - Chief Adviser Factories.
  - Chief Labour Commissioner.
  - Mines Welfare Fund Commissioners.
  - Employees' State Insurance Corporation.
2. State Departments of Labour.
3. Mining Industry, Employer's Associations.
4. Mining Industry, Trade Unions.
5. Mining Research Institutes.
6. Workmen's Compensation Boards.

9.16. The Committee recommends that the Mining Act 1952 should be amended to provide for **compulsory physical and chest X-ray examination prior to employment in under-ground mining occupations**. This should be followed by legal provision to make periodical examination of all workers exposed to the risk essential.

9.17 The Committee also recommends that the doctors employed by the mining industry should become directly associated with the Workmen's Compensation Boards with appropriate amendments in the Compensation Act.

9.18 As regards claims for disability, their review and assessment, the Committee recommends that :

- (a) A National Advisory Council on Industrial Pulmonary Diseases, and
- (b) Pneumoconiosis Medical Boards should be set up by the government for the purpose.

#### 9.19. Post-mortem Examination.

1. The Committee is of the opinion that related to medical examination of cases of pneumoconiosis is the autopsy study of the lungs of fatal cases.
2. Post-mortem examination of as many workers as possible should be carried out, if consent is obtained, irrespective of the deceased's age, actual work, length of service in the industry, evidence or otherwise of pneumoconiosis during life and apparent cause of death.
3. The Committee is of the opinion that it is only by complete post-mortem examination, with special attention to the respiratory organs and a systematic study of pneumoconiosis in all stages, that proper correlation between the clinical findings, radiographic features and lung pathology will be possible.

#### 9.20 Amendments in the W.C. Law and enlargement in the scope of the law:

The Committee would like to state in unambiguous language the fact that because the nature of the disease is slow and progressive and because the end result may be contributed by various employers, over varying periods, procedural treatment presents certain difficulties not attendant upon accidental injuries and as such any amendments to the Workmen's Compensation Law should find immediate place in the statute.

#### 9.21 Apportionment of Liability

The Committee is of the opinion that there must be legislative action either to apportion liability between employers or assess an employer under insurance principles.

#### 9.22 Discharge of cases of Pneumoconiosis

The Committee is of the opinion that—

1. the law must provide against discharge of an employee merely because of a radiological evidence of pneumoconiosis, but who is fully able to continue work provided also if the employer can supply preventive and protective measures so that the employee can continue to work with little, if any, danger to him;
2. the employment of these persons can be continued by enactment of non-disabling silicosis law which should provide for benefits when the employee is removed from work with a hazard of silica and thereafter sustains wage loss, either because of inability to find work or because he can find work only at a reduced wage ;
3. this step would result in retention of the employees with continued employment throughout the working lives of most of them without wage loss and with benefit both to employer and to employee;

4. if the employer, because of a finding of non-disabling silicosis, discharges an employee who may with reasonable safety continue at work, the employer himself, and not his carrier, must pay for wage loss ;
5. the employee should be paid for both wage loss caused by his-non-disabling condition and wage loss which may come because of disability.  
The Committee feels that extremely few cases will come up to payment under the non-disabling provision.

#### 9.23. Claimants responsibility :

The Committee is of the opinion that :—

1. the claimant should not be required to establish the proximate cause of the disease. There should be a presumption in his favour once duration of exposure is established,
2. the claimant is charged with the responsibility of giving notice to his employer, when he is aware of the disease and needed and sought medical aid (distinct manifestation of the disease),
3. the period of time within which he must file his application should also be the responsibility of the claimant. This is generally one year from the date he contracts the disease,
4. the limitations imposed by the above provision should be made applicable to disease contracted before and after the effective date thereof. This is necessary so that the law may apply to cases at that time or those which may arise in the future.  
As such the beginning of the statute of limitations should start on the same set of circumstances,
5. the laws should provide that the employer may require a pre-employment medical examination of a prospective employee,
6. the question of occupational disease—pneumoconiosis/silicosis—is a matter not within the knowledge of layman and it is only susceptible to medical interpretation, as such the claimant should have a right to appeal to a medical board for initial examination, certification and review, whose action should be entirely final,
7. the decision of the medical board of review should be final and binding upon both the claimant and the employer.

#### 9.24. Pneumoconiosis Medical Boards :

The Committee is of the opinion that :

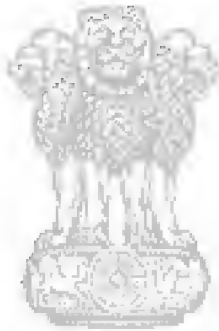
- (a) Medical Boards should be established in various parts of the country to decide controverted medical questions,
- (b) the Medical Boards' powers should be broad and it should be authorised to conduct independent hearings, such as a board of inquiry,
- (c) in cases of claim for death benefits, the Medical Board of Review should find answers to two questions :—
  - (i) the date when the accumulated effects culminated in disability traceable to the latent disease as a primary cause; and
  - (ii) the date when the compensable injury was sustained,
- (d) the Board members be paid appropriately for every case examined,

- (e) the law should make it mandatory on the W.C. Commission to refer cases to the Medical Board when an exception to the medical facts is filed by either the defendant or claimant.

#### **9.25 Chest Examination Stations or Centres:**

In the opinion of the Committee Chest Examining Stations should be established in hospitals in mining areas and adequately staffed with personnel, where all employees of the mining industry could be sent by their employers annually.

All information of medical examinations is confidential between the employee and the medical examiner unless the employee signs a statement that he is willing to allow the medical attendant to discuss his particular condition with his employer.



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## CHAPTER 10

### Notes for the guidance of Medical Officers in cases of pneumoconiosis/silicosis

10.1 Probably the most classic and notable example of a true occupational disease, from almost all angles, is silicosis/pneumoconiosis. (Notes on these diseases—annexure 'E')

10.2 Silicosis/pneumoconiosis is not usually disabling in the sense that it produces wage loss, until it has reached a so-called late stage, or unless the complication of tuberculosis or other respiratory disease is superimposed.

10.3 There is always the possibility of tuberculosis because of the silicotic base.

10.4 In the case of an accident, an employee is often himself at fault, while in the case of an occupational disease blame is seldom an element as far as he is concerned.

10.5 The employee has little opportunity to protect himself from disease.

10.6 Silicosis is a fibrotic condition of the lungs due to the inhalation of silica dust which may result in total disability to do manual labour.

10.7 Three things must be determined :—

1. Is silicosis/pneumoconiosis present ?
2. Is disability present ?
3. Is the disability due to silicosis/pneumoconiosis ?

10.8 Yardsticks for estimating disability :—

1. Earning power of the man.
2. Work capacity.

**The concept** The determination of the degree of disability is a highly specialized field in the medical profession. It is learned only by doing it and doing it repeatedly. There are no rules, tables, guides or shortcuts to follow and arrive at an opinion of disability.

The disability is primarily loss of capacity to work, not necessarily loss of earning power.

Disability should be considered in terms of health than in terms of rupees and annas as work capacity is a term of health. Earning power is a term of rupees and annas.

To expect disability to be present simply because of a diagnosis of silicosis etc., can be made is not warranted.

When disability and diagnosable silicosis, etc., co-exist the latter should not be considered the cause of disability unless other causes are reasonably excluded.

10.9 The diagnosis of dust disease must rest on the support of the following three features :—

1. Adequate history of occupational dust exposure.
2. Characteristic X-ray features.
3. Characteristic Clinical picture.

These three factors must be evaluated separately and properly correlated

10.10 In the history of dust exposure consideration must be given to :—

1. Nature of dust—its  
chemical nature,  
particle size,  
concentration in inhaled air.
2. The intensity of exposure.
3. Duration of exposure.
4. Intensity of work.
5. Nature of work.

10.11 Characteristic x-ray features.

- (a) X-ray nodulation (on X-ray plates) characteristic of silicosis does not necessarily mean the presence of disabling clinical dust disease.
- (b) The significance of reticulation, diffuse fibrosis and of coarse reticulation with beading should not be overlooked. Likewise, the presence of emphysema to measure the extent of pulmonary involvement must be taken note of.

10.12 To be deemed to be occupational diseases giving rise to compensation, the pneumoconiosis (silicosis, coal miner's pneumoconiosis, asbestosis) must satisfy the following conditions :

The radiological examination of the workers concerned must reveal:-  
micronodular or nodular shadows covering a considerable part  
of both lung fields whether or not accompanied by sign of pulmonary tuberculosis ; or

in addition to a marked accentuation of the pattern of both lungs,  
one or more pseudotumoral masses, whether or not accompanied  
by signs of pulmonary tuberculosis ; or

both of these types of injury, whether or not accompanied by signs  
of pulmonary tuberculosis.

10.13 The clinical examination of the workers concerned must reveal a deterioration of the pulmonary or cardiac function or of the general state of health as a result of the pathological processes.

10.14 The workers concerned must have been engaged for at least three years or for periods totalling at least three years in work involving a risk

of inhaling harmful dust in industries or occupations listed under part C of Schedule III of W.C. Amendment Act 1959.

Provided that the radiological requirements specified above shall be deemed to have been fulfilled even if there is only a diffuse stippling or reticulation over extensive areas of both lung fields whether or not accompanied by signs of pulmonary tuberculosis, on condition that the workers concerned have been engaged for at least three years in work involving a risk of inhaling harmful dust in industries or occupations listed, and that in cases of asbestosis their sputum contains asbestosis (asbestos) bodies.

#### **10.15 Characteristic clinical picture.**

1. Slow and insidious progression over a period of many years to decades.
2. The form of disease.
  - (a) Chronic pulmonary infection.
    - (i) Tuberculosis.
    - (ii) Non-specific infections.
  - (b) Pulmonary fibrosis and emphysema leading to heart failure.
    - (i) Signs and symptoms of increasing shortness of breath and cyanosis.
    - (ii) Signs of cardiac decompensation as sudden heart failure or slowly progressive congestive heart failure.
  - (c) Combination of two - shown by terminal phase of pulmonary heart failure (which is perhaps the most common cause of death)

#### **10.16 Diagnosis of Disability :**

1. Consider the disabling potentialities of diffuse fibrosis where occupational history is adequate and the clinical picture and X-ray features support the diagnosis.
2. This should apply to cases where tuberculosis is also in association.
3. The etiologic role of silica dust must be considered where history of exposure to inhalation of silica dust is adequate.
4. Clinical nodulation of remarkable extent is compatible with good working capacity for long periods of years.
5. Disabling silicosis may be often present with little evidence of or even in absence of typical nodular fibrosis.

#### **10.17 Clinical aspects of disability evaluation :**

1. Estimation of disability is chiefly a clinical problem rather than physiological.
2. The findings of functional tests help by confirming or strengthening clinical judgement.
 

To do this (a) evaluate the disease and its complications, and

(b) evaluate the individual—his constitutional and acquired characteristics bearing on his present condition. These may be:—

  - alcoholism,
  - old leucic infection,

- arterio-sclerotic cardio-vascular disease,
- obesity.
- skeletal and postural changes.
- psychosomatic conditions.

#### 10.18 Categories of full disability

1. Loss of earning power—economic type of disability.  
It is simple and easy to define and so generally used. It however invites falsification unless it is based on a medical cause for loss of earning power.
2. Loss of physiological integrity—loss of physical ability and this may or may not entail loss of earning power.
3. Loss of employability.
4. Loss of anatomical integrity—alteration in the tissues of the lung.

#### 10.19 Definitions

**Disability** denotes solely the injury or disease the disablement caused by which gives rise to a claim to compensation.

**Disablement**, on the other hand, means physical or mental injury or damage or loss of physical or mental capacity suffered by means of a disability or disabilities [section 2 (g) and 2 (1) of W.C. Act 1923].

**Entitlement** is the recognition by the W.C. Authority after consideration of both the medical and non-medical evidence that a disability has been influenced in its onset or course by conditions of employment. Such a disability is called an “accepted disability.”

**Worker** means a person as defined under any of the laws who is entitled for compensation under the Workmen's Compensation Act. [section 2(n)] of W.C. Act 1923.

**Reasonable Doubt** implies that there must be reasons, i.e. facts from which the doubt arises. It is one which influences the decisions arrived at by a reasonable and prudent man.

**Consensus of medical opinion** means the views of medical men recognised as speaking with authority on the disease in question in regard to the effect of employment conditions or its development.

**Functions of Medical Boards :** The function of a Medical Board is to inform and advise the W.C. Authority on the basis of all available records and their clinical examination concerning :—

- (1) the clinical history and condition of a worker on account of a disability or disabilities alleged to be related to employment.

**10. 20 Casual Connection.** Before an award can be made for a disablement or death claimed to be related to employment, a casual connection between disablement or death and employment has to be established by evidence:

### 10.21. Entitlement

(1) **General principles.** Although the certificate of a properly constituted medical authority vis-a-vis the invaliding disability or death forms the basis of compensation payable by W.C. Authority, the decision to admit or refuse entitlement is not solely a matter which can be determined by the medical authorities only. It may require also the consideration of other circumstances, e.g. working conditions, pre and post employment history, verification of all attacks of illnesses, corroboration of statements, collecting of evidence and in some instances matters of W.C. Act. The Medical Boards should examine cases in the light of the aetiology of the particular diseases and after considering all the relevant particulars of a case, record their conclusions with reasons in support in clear terms in a language which the W.C. Authority, a lay body, would be able to appreciate fully in determining the question of entitlement according to the rules. A bare medical opinion without reasons in support will be of little value to the W.C. Authority.

2. **Evidence for entitlement.** Opinion must be impartially given in accordance with the evidence, the benefit of any reasonable doubt being given to the claimant.

3. All practicable investigations to establish the fact must be carried out.

4. Evidentiary value is attached to a record of the pre-employment medical examination.

5. All opinions on attributability, aggravation or otherwise are supported by cogent reasons.

### 10.22. Clinical Aspects of Entitlement :

1. **General.** Reports of Medical Boards are the basis of executive action, as such should be in unambiguous language, give the circumstances of origin and development and the physical make-up of the person.

2. **Entitlement is dependent on** *न्यायमैव जयते*

- (a) an authentic record of the disease,
- (b) the condition being consistent with the effects of the harmful agent which would be expected to occur,
- (c) the appearance of a disease due to the risks of employment.
- (d) the proof of relationship of the established facts in the aetiology of the disease and of its normal development,
- (e) the Board's satisfaction as to the diagnosis of the disability.

3. **Physical Examination :** In the physical examination :—

- (a) the effect or function should be described so as to make apparent what normal activities the examinee is debarred from.
- (b) Where the cause or effect is obscure, advice should be sought and if necessary, hospital observation requested,
- (c) Opinion should be expressed regarding the retardation or aggravation of the disability if the same is found.

### 10.23. Assessment :

1. **Basis of Assessment.** The evaluation of a disability for compensation purposes is called assessment.

2. The purpose of the disability evaluation is to ensure compensation on equal terms for all workers of similar status suffering from a like disablement. It is estimated by reference to the physical (anatomical, physiological, functional) or mental capacity for the exercise of the necessary functions of a normally occupied life which would be expected in a healthy person of the same age and sex. It should represent the extent to which the disablement has reduced that capacity. It is determined solely on general functional capacity. Consideration is not given to the worker's capacity or incapacity to follow his specific trade or occupation.

3. Disablement might be as a result of injury or disease.

4. Medical analysis of a physical handicap must be based on the status of function.

5. The estimate of the effect of physical damage to the anatomy and the resulting physiological changes that take place must be clearly stated.

#### 10.24. Definition of function

1. When anatomic or physiological changes take place, the extent of the clinical disturbances is revealed through physical examination. However, the extent of deficiency of functional ability does not correspond to the extent of the physical limitations. The clinical findings are only factors contributing to the loss of function but they do not measure it.

2. It must be determined whether the disability is temporary or permanent and also the percentage loss of function, as it pertains to the working capacity-

3. The physical examinations and laboratory tests must be carried out to substantiate or disprove subjective symptoms and complaints.

4. The evaluation of a disability based on measurement of function is sound scientific criterion.

#### 10.25. Principles of Assessment

1. There are various stages of disability. These are :—

(i) "Period of diagnosis". A worker should be deemed to be temporarily incapacitated for the purpose of attendance and compensation during the period required for medical investigation of his pneumoconiosis/silicosis in order to make a diagnosis of the disease, determine its degree and the functional capacity of the patient and to classify him for the purposes of compensation.

This situation called the "period of diagnosis", should in no way exceed 3 months and during it the worker should be entitled to receive 75% of his wages from the undertaking in which he is employed.

(ii) treatment period.

(iii) convalescence.

(iv) temporary disablement.

(v) permanent disablement.

(vi) partial disablement.

(vii) total disablement.

2. Nil Disablement means that although a definite disability is or has been in evidence, any disablement resulting therefrom has either ceased or has become so small as not to be appreciable.

3. **No disability** means a case wherein an individual is said to be suffering from a disability but medical science can find no evidence of the existence of that disability either present or past.

4. **Permanent disability** means disability persisting for all times without change *i.e.* the disablement is supposed to be in a permanent state when the condition of the disability is unchangeable.

#### 10.26. Computation of Assessment :

1. The evaluation of disablement or assessment is necessary to receive compensation. Assessment is given in multiples of 10 rising from 20 percent (the lowest assessment on which an award of compensation can be made) to the maximum of 100 percent.

2. The period of the first award, in general, should vary from six months to two years depending upon the findings of the Board.

3. Where the disability is considered as capable of improvement, reassessment has to be done after the expiry of the first award of compensation.

4. The principle to be observed is that the evaluation should normally be based on the average degree of disablement over a reasonably long period and particularly so in respect of diseases where disablement varies with the season of the year as for example bronchitis.

**10.27. Multiple disabilities and composite assessments.**— An individual may have two or more disabilities due to employment injury when compensation will be based on composite degree of disablement.

**10.28. Diseases of the circulatory system :** In determining the assessment of the degree of disablement in cardio-respiratory diseases two principal considerations are :—

(a) An assessment of the worker's actual physical capacity based on standard exercise test (to determine the amount of genuine breathlessness, fatigue and increased pulse rate after one minute's rest.) Signs of distress and fatigue persisting after one minute's rest after exercise indicate a poor or moderate response to the test according to their degree.

(b) An estimate of the advisability of the worker engaging in work of different grades.

Suggested assessment is given below :—

Effort syndrome (with or without murmurs).

Basal assessment—Statement of distress in absence of actual signs of distress or exercise Nil

With fair exercise tolerance .. 1-19%

With moderate exercise tolerance .. 20-30%

With poor exercise tolerance .. 30% & above

#### 10.29. Clinical aspects of the disease

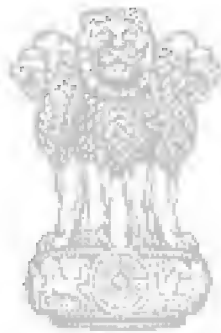
**Fibrosis of the lungs.** It is a condition in which the amount of lungs' fibrous tissue is increased to a varying extent in accordance with the severity of the disease.

It is caused by —

1. Tuberculosis.

2. Pncumoconiosis
3. Irritating gases (chlorine & bromine)
4. Pneumonia
5. Local inflammatory or destructive lesions (abscess, parasites, cysts etc.)
6. Sometimes follows collapse of the lung.
7. Some fibrosis in congestive heart failure.

The condition could be aggravated by inflammatory diseases of the lung, by certain occupations, such as coal miners', silica workers etc. The disease is an obscure condition developing over a period of time.



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## CHAPTER 11

### **Draft Model Rules under Workmen's Compensation Act (Amendment Act, 1959) for Occupational Diseases included in "Part C" of Schedule III**

The Workmen's Compensation (Occupational Diseases) Prescribed Diseases—Part C of Schedule III

#### **11.1 Citation, interpretation and commencement**

These rules which may be cited as the Workmen's Compensation Occupational Diseases (Prescribed Diseases in Part C of Schedule III) shall come into operation on....

#### **11.2 Prescribed Occupational Diseases**

Part C of Schedule III lays down four diseases. Opposite each of these there is placed a short description of the occupation or occupations for which the disease is prescribed.

**11.3 Medical conditions under which pneumoconiosis may be considered as occupations diseases** (giving entitlement to compensation dated 1.7. 1959, *i.e.* the date from which the W.C. Amendment Act 1959 came into force):

To be considered as occupational diseases giving entitlement to compensation, the pneumoconioses specified in Part C of Schedule III of the Amendment Act, 1959, must fulfil the following radiological and clinical conditions:

- (i) The radiological examination of the workers concerned must reveal—
  - (a) the appearance of generalised micronodular or nodular fibrosis covering a considerable part of both lung fields whether accompanied or not by signs of pulmonary tuberculosis, *or* in addition to a marked accentuation of the pattern of both lungs, the appearance of one or several pseudo-tumoral fibrotic formations, whether accompanied or not by signs of pulmonary tuberculosis, *or*
  - (b) the appearance of both of these types of fibrotic lesions at once, whether accompanied or not by signs of pulmonary tuberculosis.
- (ii) The clinical examination of the workers concerned must reveal a decrease or deterioration of the cardiac function or respiratory function, or a deterioration of the state of general health, caused by the pathological processes specified above.

However, the above mentioned radiological and clinical signs **shall not be considered** as being those of pneumoconioses as covered by these rules unless the workers affected have been engaged continuously for at least the periods specified below in work involving them in the risk of inhaling harmful dust in the industries or occupations specified in the Act.

Asbestosis	..	3 years
Bagassosis	..	3 years

Silicosis	..	3 years
Coal miners' pneumoconiosis :	..	3 years

11.4 Any workman who has heretofore ceased or may hereafter cease to be usually and regularly employed in an industry or occupation under this Act, in which he was exposed to harmful dust, shall make and establish his claims for disability therefrom within 3 years from the date of leaving such employment.

### 11.5 Asbestosis

For the purpose of these Rules asbestosis shall be deemed to mean a pulmonary fibrosis which is caused by inhalation of asbestos dust and manifests itself in particular by the presence of the "asbestos bodies" in the sputum, accompanied by tracheobronchitis and emphysema, and on radiological examination by ground glass appearance of the pulmonary field, of striations or reticular formations more or less marked, particularly diffuse at the bases, of diffuse stippling or reticulation over extensive areas of both lung fields, whether or not accompanied by signs of pulmonary tuberculosis.

### 11.6 Diagnosis

The diagnosis of pneumoconioses shall be carried out with all the necessary technical guarantees. Conclusive proof of the degree of development of the pathological or anatomical changes in the lungs and cardiac systems shall be furnished by the radiographic record which shall be accompanied by a full clinical examination, including the life-history of the person concerned, the record of the occupations in which he was previously employed and the nature of the harmful dusts to which he was exposed and the duration of such exposure.

### 11.7 Qualifying period

- (i) Compensation for disability or death in respect of an occupational disease under Part C of Schedule III shall not be payable unless the disease is due to the nature of his employment and contracted therein, or in a continuous employment similar to the one on which he was engaged at the time of disablement, within the two years previous to the date of disablement, whether under one or more employers.
- (ii) The time limit for contraction of the disease prescribed under Rule 11.3 shall not bar compensation in the case of an employee who contracted the disease in the same employment with the same employer by whom he was employed at the time of his disablement thereby; provided, however, that where there has been neither a claim filed nor determination made prior to the death of an employee that the disablement was due to exposure to harmful dust, the dependents of such an employee shall be entitled to compensation from death resulting from the disease due to an occupational exposure to any of the specific harmful dusts and was contracted within two years previous to the date of death.

Neither shall the right to compensation in such cases be barred by the failure of the employee or his dependents to file a claim within the two-year period prescribed by amended section 10 of the principal Act.

**11.8 Date of disablement :**

For the purpose of this rule the date of disablement shall be such date as the Pneumoconiosis Medical Board determine on the hearing of the claim.

**11.9 Liability of employer :**

The employer in whose employment an employee was last exposed to an injurious dust hazard shall be liable for the payment required by Chapter II of the principal act when disability or death of the employee shall be due to silicosis/pneumoconiosis or other dust disease.

Notwithstanding the provisions of para 11.7 (above) the employer shall be liable for the payments prescribed by Chapter II of the principal Act when such disability results within two years after the last injurious exposure as defined in para 11.7 (above) or when death results at any time from such injurious exposure.

**Note:** The Employees' State Insurance Corporation has assumed liability in cases of death or total disability resulting from silicosis/pneumoconiosis or other dust disease for all compensation and medical benefits, subsequent to those payable for the periods of temporary disability, but such liability is not placed on uninsured employers, hence the rule.

**11.10 Permanent Incapacity**

As a result of silicosis, coal miners' pneumoconiosis and asbestosis, permanent incapacity shall in every case be classified primarily according to the degree of loss of working capacity caused, radiological manifestations being regarded as an essential element but only in relation to clinical data and functional tests.

**11.11** Total disability or death (as definitely distinguished from a contributory or accelerating cause) shall be interpreted as a condition by silicosis, anthraco-silicosis, or asbestosis, or by silicosis, anthraco silicosis or asbestosis when accompanied by pulmonary tuberculosis.

**11.12 Medico-legal classification of workers** shall comprise the following situations :—

1. Normal when a worker is not suffering from silicosis/pneumoconiosis or dust disease.
2. Under observation-characterised by the presence of symptoms which while not proving the existence of typical silicosis/pneumoconiosis or dust disease and not involving incapacity for work, require frequent periodical supervision of the worker.

In the above two cases, the worker shall remain at his normal work.

3. First stage silicosis/pneumoconiosis shall include cases of definite and typical silicosis/pneumoconiosis but to an extent which does not involve any reduction of functional capacity for work.

4. Second stage silicosis/pneumoconiosis: when the incapacity due to the disease prevents the worker from continuing his employment in any of the operations in any industry where the risk of silica/other dust hazard lies,

it shall be regarded as second-degree silicosis/pneumoconiosis with entitlement to compensation as total permanent incapacity for the worker's normal employment.

5. Third degree silicosis/pneumoconiosis: When the disease manifests itself at the slightest physical effort and precludes any form of employment it shall be classified as third-degree silicosis/pneumoconiosis and give rise to compensation as absolute permanent incapacity.

6. Silico tuberculosis: Wherever silicosis/pneumoconiosis in any degree giving rise to payment of compensation is accompanied by an active tubercular process, the worker suffering therefrom shall be regarded as falling under this paragraph.

### 11.13 Review of incapacity

The cases of incapacity certified as due to silicosis pneumoconiosis shall be reviewed every two years or earlier if it is considered by the Employees' State Insurance Corporation or the Pneumoconiosis Medical Board or the worker or the undertaking that the clinical condition of the patient has altered.

### 11.14 Application for autopsy

In case of death of the claimant application for autopsy shall suffice and the findings of the postmortem shall be delivered to the dependent for compensation claim purposes.

## ACKNOWLEDGEMENT

We, the members of the Committee, are grateful to the Government for providing us an opportunity to examine certain aspects of Occupational Compensable Dust Diseases which are likely to form an important chapter in the Workmen's Compensation Administration in the country.

M.N. GUPTA,  
Chairman

D.R. SHARMA  
(Member)

K. DAMODARAN  
(Member)

New Delhi,  
The 4th January, 1960.

## **ANNEXURE 'A'**

**CHIEF ADVISER FACTORIES  
MINISTRY OF LABOUR & EMPLOYMENT  
2A/3, Asaf Ali Road, New Delhi.**

### **LIST OF REPORTS AND PUBLICATIONS**

#### **A. Industrial Hygiene Surveys :**

1. Report No. 1 INVESTIGATION ON THE INCIDENCE OF OCCUPATIONAL DISEASES IN THE MANUFACTURE OF DICHROMATE AND IN THE MINING AND CONCENTRATING OF CHROMITE. (1953)
2. Report No. 2 ENVIRONMENTAL AND MEDICAL STUDIES IN THE STORAGE BATTERY INDUSTRY (1953)
3. Report No. 3 SILICOSIS IN MICA MINING IN BIHAR (1953)
4. Report No. 4 HEALTH HAZARDS IN MICA PROCESSING (1954)
5. Report No. 5 VITAL CAPACITY OF THE LUNGS OF SILICA AND FIRE-CLAY BRICK WORKERS IN BIHAR WITH SPECIAL REFERENCE TO DUST EXPOSURE, EXERCISE TOLERANCE TEST AND INCIDENCE OF SILICOSIS. (OUT OF STOCK) (1954)
6. Report No. 6 CARDIAC RESPONSE TO EFFORT OF SILICA AND FIRE-CLAY BRICK WORKERS IN BIHAR. RESULTS OF EXERCISE TOLERANCE TEST WITH SPECIAL REFERENCE TO VITAL CAPACITY MEASUREMENT AND INCIDENCE OF SILICOSIS. (OUT OF STOCK) (1954).
7. Report No. 7 PRELIMINARY STUDY ON THERMAL ENVIRONMENTAL CONDITIONS IN TWO TYPICAL COTTON WEAVING SHEDS IN A TEXTILE MILL IN DELHI (OUT OF STOCK) (1954).
8. Report No. 8 SILICOSIS AMONGST SUPERVISORY STAFF IN MICA MINING IN BIHAR (1955).
9. Report No. 9 ACCIDENTAL DEATHS FROM INSECTICIDAL FUMIGANT MIXTURE OF ETHYLENE DICHLORIDE AND CARBON TETRACHLORIDE 3:1. (OUT OF STOCK) (1955).
10. Report No. 10 SILICOSIS IN METAL GRINDING (SCISSORS AND RAZOR GRINDERS IN MEERUT) (1955).
11. Report No. 11 SILICOSIS IN THE POTTERY AND CERAMIC INDUSTRY (1956).
12. Report No. 12 SILICOSIS AMONGST HAND DRILLERS IN MICA MINING IN BIHAR (1956).
13. Report No. 13 VITAL CAPACITY OF THE LUNGS OF WORKERS IN CERAMICS AND POTTERY INDUSTRY. (1956)

14. Report No. 14 CARDIAC RESPONSE TO EFFORT OF WORKERS IN CERAMICS AND POTTERY INDUSTRY (1956)
15. Report No. 15 SILICOSIS IN THE FEMALE. (1956).
16. Report No. 16 PROGRESSIVE MASSIVE FIBROSIS AMONGST MICA MINERS (UNPUBLISHED)
17. Report No. 17 REPORT ON THERMAL STRESS IN TEXTILE INDUSTRY.
18. Report No. 18 SURVEY OF CARBON DISULPHIDE, HYDROGEN SULPHIDE AND SULPHUR DIOXIDE HAZARDS IN THE VISCOSE RAYON INDUSTRY IN INDIA (1959).

**B. Other Publications :**

1. (Occupational Diseases): A guide to Recognition. (Priced Publication)
2. Bibliography of Industrial Hygiene (A selected list). (1954).

**C. Bihar Government Publication :**

1. Silicosis survey in Refractories Industries in Bihar. (Priced Publication) (1955).

EXTRACTS OF REPORTS PUBLISHED BY THE OFFICE OF THE  
CHIEF ADVISER FACTORIES, GOVERNMENT OF INDIA,  
MINISTRY OF LABOUR.

1. Investigation on the incidence of occupational diseases in the manufacture of dichromate and in the mining and concentrating of Chromite—Report No. 1 (1953).

An enquiry was carried out on the working conditions and on the incidence of occupational diseases in the dichromate-producing industry. All the 631 workers employed in the seven factories in operation at the time of the enquiry were examined.

Working conditions in the factories were generally far from satisfactory, health and safety measures being overlooked in most cases. The unsatisfactory conditions might, to a large extent, be attributed to the fact that the factories were established at a time when there was serious shortage of building materials.

Skin affections were found in 132 workers (20.9% of the total number) and in 124 workers (19.7%) typical skin ulcers were found. Ulcers were of especially high frequency on the lower extremities of the limbs. Nasal cartilage perforations were found in 132 workers (20.9%) and nasal mucosal ulceration in 130 (20.6%).

A series of recommendations have been made to eliminate, or, at any rate, to reduce the health hazards.

A combined environmental and medical survey was carried out in a chromite mine and chromite concentration plant to determine the effect of chromite dust inhalation on the health of the workers.

The higher degrees of dustiness were found at jaw crushing, ball milling and bagging sections. The dust samples from the jaw crusher and ball mill sections contained on an average 7.8% of Chromium (as  $\text{Cr}_2\text{O}_3$ ) and 1.8% of free silica; dust samples from the packing section contained 45.0% of chromium (as  $\text{Cr}_2\text{O}_3$ ) and 5.3% of free silica.

Ninety-nine workers at the chromite mine and concentration plant were medically examined and this included chest X-ray photographs as well as recording of occupational history. Fifty-nine workers at a nearby magnesite mine, engaged in hand dressing of the ore were subjected to the same medical examination. Those groups, drawn from the same socio-economic class as the chromite workers, served as 'control'. Chromium exposure, occurring in chromite mining and concentrating, was found to have no adverse effect on the skin or nasal mucosa of the exposed workers. Thirty-two workers in the chromite group, as against only nine workers in the magnesite group, had exaggerated pulmonary markings as revealed by the X-ray films, thus indicating that chromite dust inhalation is likely to cause these changes. The pulmonary markings, however, were not associated with respiratory tract symptoms. A positive correlation was found between the length of service in chromite operations and lung effects.

## **2. Environmental and Medical studies in the storage battery industry—Report No. 2 (1953).**

An industrial hygiene survey, comprising of both environmental and medical aspects, was carried out, on an all-India basis in the storage battery manufacturing industry. All the 16 factories in existence at the time of the survey formed the subject of the investigation and 492 workers employed in these factories were examined.

The environmental studies indicated that the lead concentration in many of the work room atmospheres exceeded the threshold limit value of 1.5 mg. per 10 cubic meters of air and as a consequence 70% of the workers examined were exposed to harmful concentration of lead. This resulted in 56.5% of the workers showing urinary lead values in excess of 0.1 mg. per litre, 48.7% blood lead values in excess of 0.08 mg. per 100 c.c. and 57% the presence of porphyrin in urine. Positive correlation was found to exist between urinary lead values, blood lead values and porphyrin.

10.6% of the workers showed clinical signs and symptoms of early lead poisoning.

There was a close relationship between the time-intensity factor of lead exposure and early plumbism.

Based on the studies, recommendations have been made with regard to proper engineering control of the environments.

## **3. Silicosis in mica mining in Bihar—Report No. 3 (1953)**

A detailed environmental-cum-medical investigation was carried out in the mica mining industry in Bihar in the course of which 329 miners with relatively long periods of continuous employment were medically examined and their chest roentgenograms taken. It was found that the miners were exposed to rock dust, varying in silica content from 11% to 67% with a

median of 42%. The degree of dustiness varied from one occupation, to another, being the highest (800 mppcf) for pneumatic drilling carried out without dust control measures and the lowest (7 mppcf) for wet drilling.

Nodular and conglomerate silicosis was found in 34.1 percent of the miners examined, and was directly associated with the degree of dustiness of the occupations as well as the duration of time that they had worked at those occupations. Pulmonary tuberculosis was found in 18.6 per cent of the miners.

A series of recommendations has been made which will materially assist in minimizing the hazard of pulmonary disease in mica mining.

#### **4. Health Hazards in Mica Processing—Report No. 4 (1954)**

An investigation, comprising of both environmental and medical aspects, was carried out in the mica processing industry in Bihar. Observations were made in five factories and 61 workers were medically examined. It was found that the preparation of mica dust by mechanical grinding as also screening of mica gave rise to considerable dust, indicating the necessity of introducing suitable dust control measures. Though there was no case of nodular silicosis amongst the workers examined, the chest roentgenograms indicated the possibility of 'nodular' fibrosis resulting from exposure to mica dust over a number of years.

#### **5. Vital Capacity of the lungs of Silica and fire-clay brick workers in Bihar with special reference to dust exposure, exercise tolerance test and incidence of silicosis—Report No. 5 (1954).**

(Out of Print)

#### **6. Cardiac Response to effort of silica and fire-clay brick workers in Bihar. results of exercise tolerance test with special reference to vital capacity measurement and incidence of silicosis—Report No. 6 (1954).**

(Out of Print).

#### **7. Preliminary Study on thermal environmental conditions in two typical cotton weaving sheds in a textile mill in Delhi— Report No. 7 (1954).**

(Out of Print).

#### **8. Silicosis Amongst supervisory staff in mica mining in Bihar Report No. 8 (1955).**

This is a detailed account of the health of 42 members of the supervisory staff employed in the mica mines. In their underground work they were exposed to dust, though to a somewhat less extent than the miners. The ages of the group ranged from 20 to 60 and the periods of employment from 1 to 30 years. The incidence of silicosis increased with age, and employment; the earliest evidence of silicosis was found at the age of 27, and employment of 7 years under-ground. After 15 years' work underground all showed radiographic evidence of silicosis. Of 42 in the group 19 (45.2%) showed silicosis: 12 in stage 1, 3 in stage 2, and 4 in the conglomerate stage. There were 8 cases of tuberculosis and in all of these silicosis was also present: 4 in



stage 1, 2 in stage 2, and 2 in the conglomerate stage. Cardiac involvement was diagnosed in 3 cases, 1 each of enlarged heart, enlarged aorta, and hypertension.

**9. Accidental deaths from insecticidal fumigant mixture of ethylene Dichloride and carbon tetrachloride 3.1—Report No. 9 (1955).**

This is a report on 3 cases of fatal poisoning by the vapours of ethylene dichloride and carbon tetrachloride. These cases occurred in warehouse workers who were handling drums containing the fumigant. It was later found that 1 of the drums had sprung a leak at a weld point. The men had been exposed to the vapours for possibly 2 1/2 hours. The symptoms were giddiness, vomiting and rapid loss of consciousness. They were taken to hospital where consciousness returned about 6 hours later for a period of 10 to 12 hours but then convulsions set in and death occurred in 2 patients about 19 hours after admission but the third patient survived till the 5th day. A very short description of the post-mortem findings is given. There is some account of the investigations which were made. Some of the literature on the toxicology of ethylene dichloride and of carbon tetrachloride is quoted with a statement of the hygienic and other precautions which should be taken in the handling and use of the fumigant.

**10. Silicosis in metal Grinding (Scissors and Razor Grinders in Meerut),—Report No. 10 (1955).**

The cutlery industry is one of the oldest in India. Meerut one of the main centres, is famous for razors and scissors and has a daily output of 1,500 to 2,500. There are about 350 units in the country employing about 5,000 workers. The processes include hand-or machine-forging of blades, heat treatment, grinding, glazing and polishing, assembly and finishing. The raw materials used are high-carbon steel, stainless steel, plastic and wood. This study was made in Meerut in 1954. There were 18 small units, working in old, ill-ventilated and overcrowded buildings. The bulk of the work was done on sand-stone but a few carborundum wheels were also used. The grinding wheels were "so installed that they were partly in a pit filled with sand"; Grinding was done dry.

4 samples of deposited dust from rafters were analysed and showed an average of 29% free silica. Dust counts taken in 12 scissors-grinding factories ranged from 31 million to 110 million particles per cubic foot of air (m.p.p.c.f.) and all exceeded the maximum allowable concentration of 20 m.p.p.c.f. for dust with this proportion of free silica.

Radiographic examinations were made of 44 grinders; most were in the age-group 20-35 and only 1 was over 35. Silicosis was diagnosed in 12 (27.2%) The incidence was progressively higher with increase of the period of work as grinder. Of the 44 grinders 40 were exposed to dust concentrations of 25 to 75 m.p.p.c.f. There is a progressive increase in incidence of silicosis with increase in the time intensity factor (duration of employment and degree of exposure in terms of m.p.p.c.f.) The radiographs show in the first stage diffuse mottling and few separate nodules; the second stage has well-defined nodules over both lung fields, and the conglomerate stage has areas of massive fibrosis and enlarged hilar shadows. Tuberculosis was diagnosed in 4 radiographs, 2 associated with silicosis.

Installation of exhaust systems would not be within the slender resources of most of the factories. Wet-grinding would raise doubts about the effect of water on the home-made abrasive wheels and on the work, but investigations on these lines may be necessary for control of the dust problem.

### **11. Silicosis in the pottery and ceramic industry—Report No. 11 (1956).**

This report is a concise statement of the results of a survey of 12 factories in different parts of India; 5 of the factories are large, 3 of modern design, the other 2 and the smaller factories investigated consist of old buildings and sheds. The goods manufactured are earthenware, stoneware, and porcelain which is a translucent white pottery. Most of the output is of cheap types of earthenware. The main health hazard is silicosis; lead poisoning has been virtually eliminated by the use of low solubility fritted glazes. The free silica content of the pottery and ceramic bodies and glazes ranged from 7% to 36%.

Environmental studies included dust sampling with the midget impinger, and counting by light-field technique. The counts are expressed in millions of particle per cubic foot of air (m.p.p.c.f.) and the standards of permissible dustiness are those suggested in the United States (Arch. Indust. Hyg. & Occup. Med., 1953, v. 8, 296). The amount of exposure to dust of each class of workers is calculated on the dust concentrations at the process in an 8-hour day. Weighted dust exposure was calculated on the periods spent on different jobs. Of 921 workers examined only 250 (27%) were exposed to concentrations of less than 5 m.p.p.c.f.; 488 (53%) had dust exposures of 6-20 m.p.p.c.f., and 183 (20%) had exposures of over 21 m.p.p.c.f. A time-intensity factor was calculated for each worker on the number of years spent in a particular occupation and the weighted dust exposure for the occupation.

The total number of persons employed in the industry in 1953 was 15,974 workers of whom 20.7% were women.

Medical examinations were made of 921 workers; the sample for each of the 12 factories was taken from workers with over 5 years' service. The data from clinical and radiographic examinations were analysed by a punch-card system. The results showed that 648 (72.8%) of male workers and 24 (75%) of female workers were in the age-group 20-39 years and only 229 (24.8%) of all workers were over 40. The radiographs are classified according to the International Scheme adopted by the ILO Conference, 1950. This Scheme is reproduced as an appendix to this report. Of the 904 radiographs taken only 808 were considered to be of satisfactory standard. Silicosis was diagnosed in 127 (15.7% of the satisfactory radiographs; 3 of these were of women; 108 (85%) of all subjects with silicosis were aged 30 or over. There was a progressive increase with age; 67 (20.7%) of age-group 20-39, and 60 (79.3%) of age-group 40-79. The frequency rates of silicosis also show a progressive increase with increase in dust exposure. In relation to the time-intensity factor of dust exposure 26% of all cases of silicosis had a factor up to 100, whereas 36% of the same group had a factor of 101-400. The data suggest that the time-intensity factor recommended for this industry should not exceed 100, which would correspond to 5 m.p.p.c.f. of air on an estimated exposure of 20 years. The incidence of silicosis in various occupations and processes is shown in tables. There were 51 cases of tuberculosis (6.3%) in the 808 examined; of these 30 cases were of silico-tuberculosis and 21 of tuberculosis without radiographic evidence of nodulation.

Recommendations are made for suppression of dust, separation of processes, periodical medical examinations, respirators, protective clothing, cleanliness of the factories, and washing facilities for workers. The use of powdered flint or quartz, for operations such as placing and polishing ware, should be prohibited.

## **12. Silicosis amongst hand drillers in mica mining in Bihar—Report No. 12 (1956).**

This report gives detailed information on 62 hand-drillers drawn from 3 mica mines in Bihar. Of 1,010 mica mines in India, in 1952, drilling was done by hand in 829, and with compressed-air drills in 181 mines. In 1956 hand-drilling was done without dust traps in 74% of mica mines. Dust control was not required by law up to the end of 1952 but wet drilling is now being enforced and mechanical ventilation is recommended in addition. The mean dust counts in dry and in moist rock drilling were of the order of 97 and 21 million particles per cubic feet of air (m.p.p.c.f.) respectively. The main Report of 1953 showed that hand-drillers had an average exposure to dust of 45 m.p.p.c.f.

Of the 62 hand-drillers examined 17 (27.4%) had silicosis, 10 in stage 1, 5 in stage 2, and 2 in the conglomerate stage. There was no correlation between age and incidence, of silicosis but the incidence increased with the number of years of underground work. The 2 patients in the conglomerate stage had worked 15 and 20 years respectively; the 15 others with silicosis had an average exposure of 11 years. The time-intensity factor (number of years worked and concentration of dust in m.p.p.c.f.) shows a progressive increase in frequency rates of silicosis until a rate of 41% is reached in the 12 hand-drillers with time-intensity levels over 800. Active tuberculosis was found in 4 of the 62 hand-drillers; silicosis was also present in 2 of these.

Similar investigations are necessary in mica mines of other States.

## **13. Vital capacity of the Lungs of workers in ceramics and potteries industry. Report No. 13 (1956).**

Vital capacity measurements were made of 647 pottery workers, 618 males and 29 females, in 5 factories in 3 Indian States. A Collins Vitalometer (water-sealed spirometer) was used. The measurements showed that average vital capacity rose progressively with standing height up to 175 cm. and with increasing weight up to 160 pounds, and had a close relationship with body surface area. There was a gradual fall of vital capacity with age from age-group 20-29. All the data agree well with those of a previous study of 332 workers in the refractories industries. Correlations between these physical data and vital capacity are shown in tables.

A table is given showing the relation between vital capacity per square metre of body surface in cases of silicosis. In the 647 workers examined the average vital capacity per square metre of body surface was 1.94 litres. There were 127 cases of silicosis; of those 91 had vital capacity less than 1.94 litres, and 36 over 1.94 litres. Of the latter group, with higher average vital capacity, all were in stages 1 and 2 of simple silicosis whereas in the former group with lower average vital capacity, 7 were classified as complicated silicosis. (This does not seem to support the author's statements that low vital capacity measurements are not helpful in a study of pulmonary dust disease).

In a study of vital capacity measurements in 29 female workers 3 cases of simple silicosis were diagnosed radiographically, all in the earliest stages and without symptoms or clinical signs, 1 was employed in the saggar shop and 2 in the finishing department. In both of these processes the dust concentrations were low, 1-20 m.p.p.c.f. and it is suggested that by working in a squatting position the women were in a zone of fine dust. Further investigations are needed to clear up this apparant anomaly.

**14. Cardiac response to effort of workers in ceramics and potteries industry—  
Report No. 14 (1956).**

Exercise tolerance tests were carried out on 62 workers employed in a ceramics factory in Calcutta, in which dust concentrations were within permissible limits in nearly all processes. Of the 62 workers tested 54 were under 40 years of age. The test was a simple squat-jump exercise. Only 17% of the workers could continue beyond 2 minutes; the 38 workers in the 20-29 age-group could do the exercise for an average of 90 seconds only. Pulse readings are given before the exercise and during recovery. There were 5 cases of silicosis, all in stage 1; 3 of these workers had an exercise tolerance test score less than the average.

**15. Silicosis in female workers in ceramics and potteries industry—Report  
No. 15 (1956)**

This is a report on 3 cases of silicosis in female workers in the pottery industry. In 1953, out of a total of 15,974 workers employed in 31 factories, 3,301 (20.7%) were women. In the pottery industry women are generally employed in unskilled work and in the skilled operations of casting and moulding, and in hand finishing which consists of sandpapering the semi-dried ware. Dust concentrations at this process ranged from 3 million to 70 million particles per cubic feet of air (m.p.p.c.f.) The body of the ware contains an average of 31% of free silica. No exhaust ventilation is provided for this process.

The 3 patients described were; (1) aged 42, employed for 6 years as a hand finisher; she was exposed to dust concentrations of 5 m.p.p.c.f.; (2) aged 48, employed as a hand finisher for 10 years; dust exposure was 10 m.p.p.c.f.; (3) aged 26; employed for 6 years as a clay washer and 3 years as a hand finisher; the weighted dust exposure was 208 m.p.p.c.f. The clinical examinations gave normal results, and the radiographs showed similar changes, of Category 2, simple silicosis, in all 3 workers.

It is considered that so long as female workers are exposed to dust of free silica, and the risk of contracting silicosis, strict controls and medical supervision must be maintained.

**16. Progressive massive fibrosis amongst Mica miners—Report No. 16. (Unpublished)**

**17. Report on thermal stress in textile Industry—Report No. 17 (1957)**

The tasks undertaken by the authors were to measure the magnitude of thermal stress in Indian textile mills, to ascertain the response of Indian workers to it, and to recommend a safe upper limit of exposure to this type of stress which could serve as a guide to the inspectors of factories. The present extract is an abridged report of the major findings.

For experimental purposes a climatic chamber was used and in it 15 volunteer workmen were studied when working at controlled rates in controlled environments. After full acclimatization their ability to withstand thermal stress was comparable with that of American soldiers observed in the war-time investigations at Fort Knox, Kentucky, (Bulletin, 1945, v.20, 480). No significant differences as regards race were demonstrated.

In textile mills studies of water ingestion and excretion were carried out. Under comparable conditions of thermal stress the sweat losses of Indian workers were similar to those reported in subjects of European stock. The salt intake of the average Indian is so high that no significant salt depletion occurred in any of the subjects studied.

A key task in the textile industry is the preparation of the warp for the loom. It is performed by skilled men who draw the ends of the yarn through metal slots. The drawing-in operation was performed in the climatic chamber in a variety of thermal conditions and the amount of work done was measured. Neither the dry-bulb nor the effective temperature showed any significant correlation with the rate of production but when the wet-bulb temperature exceeded 84.30° F. productivity fell significantly, and this was true whether the dry-bulb temperature was 92° F. or 105° F.

The personal comfort of the Indian workers was more closely related to effective temperature than to either the dry-bulb or the wet-bulb temperature. The upper limit of the comfort zone was slightly below the effective temperature of 86° F., and the workers complained of cold when the effective temperature was in the mid-seventies or below.

During two summers and one winter many thousands of observations of temperature measurements were made in 9 mills. In all the mills the managements made efforts to maintain a high humidity in the weaving departments and, to a lesser degree, also in the spinning rooms of the better mills. The humidity was rarely controlled in the carding departments and never in the finishing departments.

In the weaving departments the dry-bulb temperatures ranged usually between 75° and 95° F., with wet-bulb temperatures of 65° F. to 85° F. The wildest fluctuations of temperature occurred in finishing departments with dry-bulb temperatures of 80° to 115° F. and wet bulb temperatures of 60° to 90° F.

The "safe-upper limit" chosen for the operation of textile mills in India is 85° F. when the air is saturated with water vapour, and the permissible wet-bulb temperature is progressively reduced below 85° F. as the dry-bulb temperature rise above that figure. The temperatures apply to work requiring moderate rates of energy expenditure, when light clothing is worn and the air speed in the working position is not less than 100 ft. a minute. With the stipulated air speed the maximum conditions represent an effective temperature of 82.4° F. when the dry-bulb temperature is 85° F. and when the wet-bulb temperature is 100° F. The permissible effective temperature is 86.7° F.

Temperature measurements made in factories showed that the safe upper limit was frequently exceeded.

It was recommended to the Government of India (i) that similar studies, to include the measuring of radiant heat exposures, should be made in the steel, glass, aluminium, paper and other hot industries in India; (ii) that

steps should be taken to ensure that the upperlimits of temperature referred to are not exceeded in textile mills; (iii) that studies of thermal stress and related climatic problems as they affect persons at work and at home, and the medical effects should be made part of the permanent research programme of India; (iv) that as further knowledge is gained suitable amendments should be made to the factories Act; and (v) that the quality and performance specifications for the hygrometers permanently installed under the Factories Act should be amended or supplemented to provide for an accurate and reliable instrument.

**18. Survey of carbon disulphide hydrogen sulphide and sulphur dioxide hazard in the viscose rayon industry in India—Report No. 18 (1959).**

The manufacture of rayon by the viscose method is considered a hazardous process because of the large scale use of toxic and poisonous chemicals chief of which is carbon disulphide. Poisoning by carbon disulphide has been included in the list of Notifiable diseases under Section 89 of the Factories Act 1948.

A comprehensive medical-cum-environmental study was carried out by officers of the organisation of the Chief Advisor of Factories during 1957. Out of 4 factories situated in 3 States and employing about 4119 workers, three factories were selected for detailed studies. Out of 1412 workers in these factories who are directly exposed to various toxic chemicals 270 were medically examined and this represents a fairly representative sample of the population exposed to hazardous chemicals.

The environmental studies of the extent of exposure of the workers to various concentrations of the toxic chemical have spot-lighted the various hazardous operations in the industry.

The various types of medical examinations (general, clinical, ophthalmological, otological, psychological, neurological and haematological) have revealed interesting findings of the harmful effects of the various chemicals, which have been shown in various tables in the report.

The report gives details of the methodology of work and methods of diagnosis in case of carbon disulphide intoxication to assist medical officers in diagnosing such cases.

The report also includes a large number of recommendations for the control of hazards due to the various toxic chemicals in the various processes met within the industry through such arrangements as enclosure of processes, exhaust arrangement, improvement in ventilation, routine estimations of the concentrations of the chemicals in the atmosphere, routine medical check up of worker, shorter hours of work, use of protective clothing etc.

## ANNEXURE B.

### Mysore Silicosis Rules

Notification No. D. 3437 of 13th January, 1940.

1. (a) These rules shall be the Mysore Silicosis Rules.  
(b) They shall apply to all industries specified in Schedule "A" of these rules. The Government may from time to time add to or vary the Schedule.  
(c) They shall come into force on such date as the Government may, by notification in the official Gazette appoint.
2. In these rules, unless there is anything repugnant in the subject or context,—
  - (a) "The Act" means the Mysore Workmen's Compensation Act, No. XIV of 1928, as amended by Act III of 1936.
  - (b) "Commissioner" means the Commissioner for Workmen's Compensation appointed under the Act.
  - (c) "Initial Examination" means examination prescribed under Rule 9(d) of these rules.
  - (d) "Periodical Examination" means examination prescribed under Rule 9(d) of these rules.
  - (e) "examiner" means registered medical practitioner whose name appears in the list published by Government in the official Gazette as prescribed in Rule (6) of these rules.
  - (f) "Mining" as specified in Schedule "A" of these rules shall be construed as a reference to underground work or employment beneath the surface; to work or employment upon or about rock crushers in a rock crushing station and to work or employment in a sample-crushing room or assay office or on any tailings dump.
3. For the purposes of these rules, Silicosis shall mean Silicosis of the lungs.
4. A person shall, for the purposes of these rules, be deemed to have or to have had Silicosis.—
  - (a) In the Ante-primary stage, when it is found on medical and radiological examination that the earliest detectable specific physical signs of Silicosis are or have been present, whether or not capacity for work is or has been impaired by such Silicosis.
  - (b) In the Primary stage, when it is found on medical and radiological examination that definite and specific physical signs of Silicosis are or have been present and that capacity for work is or has been impaired by that disease though not seriously and permanently.
  - (c) In the Secondary stage, when it is found on medical and radiological examination that definite and specific physical signs of Silicosis are or have been present and that capacity for work is or has been seriously and permanently impaired by that disease.
  - (d) Silicosis with active Tuberculosis is equivalent to the Secondary stage.

5. (a) Every workman who desires the grant of compensation under these rules, shall apply to the Commissioner in whose jurisdiction he resides in Form "A" in duplicate.

(b) Application for compensation by dependants shall be made in Form "B" and shall be transmitted in duplicate to the Commissioner.

6. Medical Examination.—The Government shall under these rules publish, from time to time, in the official Gazette the names of Registered Medical Practitioners who are empowered to carry out examinations and issue certificates.

7. Government may also appoint Medical Officers in service as *ex-officio* examiners for the purposes of examination and issue of certificates.

8. (a) Government shall establish a Medical Bureau consisting of three or more Medical Practitioners or Officers with special knowledge of diseases of the lungs and respiratory organs; and the Commissioner may, in cases of doubt, or shall in cases where the employer or the workman is dissatisfied with the certificate granted under these rules, refer the case to the Bureau.

(b) In all such cases the applicant shall be X-rayed and clinically examined. The findings of the Bureau shall be final.

9. (a) Any applicant desiring to work in any of the industries specified in Schedule "A" after these rules have come into force, shall submit himself to a medical examination by an examiner before whom he shall be caused to appear by the employer.

(b) The examiner shall make such examination (including stethoscope examination) of the applicant as will enable him to fill in correctly the initial certificate in Form "C" that he is free from any disease of the lungs and respiratory organs and is, in other respects, physically fit for the work for which a certificate is sought.

(c) Such certificate shall be transmitted to the applicant and shall be valid for a period not exceeding five years.

(d) After the initial examination, every workman shall be brought before an examiner by the employer for medical examination at intervals of not more than five years over a period not exceeding ten years, and thereafter at two yearly intervals.

(e) After every examination subsequent to the initial examination, a certificate in Form "D" stating that the workman is not suffering from Silicosis or a certificate in Form "D"(a) stating that the workman is suffering from Silicosis and in what stage, shall be issued and it shall be the duty of the employer to inform the workman of the contents thereof.

10(a) Every workman who is already in service at the time of these rules coming into force; if he desires to become eligible for the benefits under these rules, shall be duly medically examined by an examiner before whom he will be caused to appear by the employer and if found suffering from Silicosis as defined in Rule (4), he shall be entitled to compensation as provided in the Act.

(b) If it is found not possible for such workman to be present for initial examination and if he is not examined on the day he presents himself, his name shall be entered in a register maintained for such a purpose and he shall be deemed to have complied with the rules, provided that he reports



himself for examination without delay, on being notified subsequently by the employer, of a date and hour on which the examination will be carried out. Failure on the part of the workman thus notified to present himself for examination without sufficient cause shall render him ineligible for compensation and shall release the employer from all obligation under these rules, should the workman at any other date present himself for examination and be found to be suffering from Silicosis.

11.(a) Wherever the Commissioner considers it necessary to be satisfied by post mortem examination whether a deceased workman had Silicosis and having obtained the previous consent of the legal representatives of the deceased, to the performance of such post mortem examination, he may request any Government medical officer, to conduct such an examination and send him a copy of Form "E" to be filled in by him. A medical examiner nominated by the employer shall be given an opportunity to be present at such post mortem examination and shall either agree or disagree with the findings of the Government medical officer. In the event of disagreement the report on the case with the lungs shall be referred to the Medical Bureau by the Commissioner for their opinion.

(b) The medical officer so requested by the Commissioner shall, without avoidable delay, make the necessary examination and forward his report to the Commissioner in Form "E" and if Silicosis has been found to be present in the lungs of the deceased, such lungs shall accompany the report.

12. When once a workman has accepted compensation, he is prohibited from working again as such; but he is not obliged to accept compensation and give up his occupation as such.

13. If a workman continues to work in any of the industries specified in Schedule "A" for a longer period than three months after he had been certified to be suffering from Silicosis, he is not entitled to a greater amount of compensation than that to which he was entitled when first certified. But this loss of benefit does not extend to his dependents.

## **Annexure C**

*Extract from the "Meeting of Experts on the International Classification of radiographs of the Pneumoconioses" (Journal "Occupational safety and Health"—April-June 1959—published by the I.L.O. Geneva.)*

**Establishment of an International Classification of Radiographs of the Pneumoconiosis.**

### **GENERAL CONSIDERATIONS**

In accordance with the results of the investigation, the experts agreed to accept the fact that the Sydney classification, valuable as it was for the radiological appearances of pneumoconiosis in coalminers, was not ideal for the classification of certain radiological appearances encountered in other industries. They recognised that a single classification could not apply to all the existing forms of pneumoconiosis, and that for this reason it was desirable not to consider the pneumoconioses of vegetable origin, which are radiographically very different. They therefore decided to confine their attention to the pneumoconioses provoked by mineral dusts.

It was clearly stated that the classification should describe the radiographic appearances of the persistent opacities associated with pneumoconiosis (the word "persistent" was introduced to exclude transient opacities). The qualitative and quantitative aspects of these opacities should only constitute one factor in the diagnosis of the pneumoconioses. They must always be related to the occupational history and, where necessary, to the appropriate clinical and laboratory findings.

### **VALUE OF SINGLE CLASSIFICATION**

The difficulty of using a single classification for the radiological appearances of all the pneumoconioses provoked by mineral dusts was clearly stressed. It was certain that, especially in the early stages, there might already exist great differences according to the nature of the dusts and their silica content, and according to the industries under consideration. From a strictly scientific point of view each type of pneumoconiosis should probably have its own classification, but it was also recognised that radiological shadows were often similar whatever might be the chemical composition of the dusts or the industry in which they were encountered. Nevertheless, the experts agreed that there might be difficulties in bringing the very different radiological appearances of certain pneumoconioses, such as asbestosis and berylliosis, within the classification.

### **OBJECT OF THE CLASSIFICATION**

The object of the classification was to codify the radiological appearances of the pneumoconioses in a simple reproducible way. This would enable statistical and epidemiological investigations to be undertaken to assess the size and nature of pneumoconiosis problems and determine the steps to be taken for the control of the disease. The classification was not intended to define pathological entities, nor to take into account the question of working capacity. In particular, it would have no relation to the legal definition of stages of pneumoconiosis for compensation.

## DEFINITION

At the end of the general discussion, the experts adopted a definition for the classification as follows :

**"International classification of persistent radiological opacities in the lung fields provoked by the inhalation of mineral dusts."**

They intended that this definition should cover all coal and carbon dusts.

## OPACITIES

Three main groups of opacities were recognised; linear opacities, small opacities and large opacities.

### Linear Opacities.

Several sittings were devoted to discussing whether linear opacities should be accepted in the classification and, if so, how this group should be defined. Although there was complete agreement that linear opacities could be seen in those who had never been exposed to dusts, it was held by some experts that they occurred with greater frequency among workers exposed to dust in industries other than coal mining. The experts also agreed that the pathological changes of pneumoconiosis could be found in the lungs in the absence of radiological abnormality, and in particular it was mentioned that, in the case of South African miners with long service underground, a close correlation existed between linear markings seen on the radiograph and micronodulation found at autopsy. On the other hand, evidence was brought forward that, in the case of coalminers, there was, on the average, more dust and more pathological change in lungs which had shown small opacities on the radiograph than in those where the X-ray picture was within normal limits.

A divergent point of view was that these linear shadows would be better accommodated in a second classification for radiographs of those exposed to a greater silica risk. It was, however, argued against this that as the experts were only concerned with describing radiological shadows it should be possible to get them all into one classification.

The importance of early diagnosis in prevention was appreciated by all, and arguing on these lines it was agreed that at least the first stage in the classification should enable workers to be diagnosed before their health was affected or their future jeopardised. Evidence was forthcoming that as regards coalminers, category 1 fulfilled these conditions, but in other industries, where the silica hazard was greater, it seemed improbable that this was so. Agreement was thus reached to accept a linear category in certain industries on a trial basis.

After a further lengthy discussion, it was decided to divide the linear opacities into two categories. The first, denoted by the Symbol "Z" was accepted as a "warning stage" outside the classification which could be used as seemed desirable in any particular industry for the purposes of prevention. The experts agreed to define category "Z" as "increased lung markings."

The second category of linear opacities denoted by the symbol "L" was placed within the classification, but it was agreed that it would not apply to coalminers and that its use in any other industry was left to the discretion of the medical officer in charge. As several experts considered that this category may represent an early stage of pneumoconiosis, it was decided that it should at least be given a trial in any industry with a high silica risk. It was defined as "numerous linear or reticular opacities, the lung pattern being normal, accentuated or obscured".

### Small Opacities

The two features to be considered in films showing small opacities are their dimensions and number, which should be assessed separately and defined by a special symbol. As the order in which these symbols are written is of little importance it may be left to the choice of each physician as he thinks fit. Nevertheless, in establishing the classification, it has seemed more logical to consider first of all the definition of the primary opacities, and thereafter to consider their classification.

**Dimensions of the small opacities :** The experts noted that the opacities varied in type and that more than one type could be present at the same time. They accepted the following three types, defined by the diameter of the predominant opacities.

#### "p" Opacities :

The expression "pinhead", which is difficult to translate into some languages by a word beginning with "p", has been replaced by "punctiform" which has the advantage of retaining the symbol "p" already widely used. The word "punctiform" appeared to give an exact idea of the image observed, which refers to tiny opacities of various shapes up to about 1.5 mm.

#### "m" Opacities :

The experts agreed that the symbol "m" should apply to opacities whose greatest diameter was between 1.5 and 3 mm. These might be defined as "micro-nodular" or "miliary" opacities. The term "miliary" (millet grains) had the advantage of giving an impression of the size of the opacities, and, as such was currently in use in several countries, though in other, it had the disadvantage of implying a tuberculous aetiology. All the experts agreed that the symbol "m" should not be used to denote "mixed" opacities.

#### "n" Opacities :

The experts decided to apply the symbol "n" to nodular opacities of a size between 3 and 10 mm.

**Number of small opacities :** The experts were in agreement that the basic idea underlying the categorisation of small opacities was that of number, but as a simple count was impossible an indirect estimate of number had to be made from an unhappy combination of extension and profusion (density). It was agreed that the verbal definitions were unsatisfactory but it was hoped that the standard films would make up for their deficiencies.

The following definitions were accepted :

**Category 1:** a small number of opacities in an area equivalent to at least two anterior rib spaces and at the most not greater than one-third of the two lung fields.

**Category 2:** Opacities more numerous and diffuse than in category 1 and distributed over most of the lung fields.

**Category 3:** Very numerous profuse opacities covering the whole or nearly the whole of the lung fields.

### **Large Opacities**

The experts discussed at some length the various possible methods of classifying the large opacities. They all agreed on the need for a more accurate definition of the earliest category A, and that it was illogical to have a category D, denoting distortion of the pulmonary anatomy in a series, A, B and C, based on size. It was also agreed that as the upper limit of "n" opacities, and hence the lower limit of A opacities, was 1 cm it was better to retain metric measurements rather than rib spaces to define the upper limit of A. An attempt was also made to define categories B and C in terms of the longest diameter of the opacities but a test showed its impracticability.

The experts finally agreed to recognise three categories defined as follows:

**Category A :** an opacity having a longest diameter of between 1 and 5 cm, or several opacities each greater than 1 cm, the sum of whose longest diameters does not exceed 5 cm.

**Category B :** One or more opacities, larger or more numerous than those in category A, whose combined area does not exceed one third of one lung field.

**Category C:** One or more large opacities, whose combined area exceeds one-third of one lung field. It was agreed that the background should be specified as far as possible.

Where there was an appreciable difference in the appearance of the two lungs, the two appearances might be described separately, beginning with the right lung. This separate description might apply to all the groups of opacities, but its use is optional; it should not entail any changes in the categorisation of a radiograph, which should always be considered as a whole.

### **RECOMMENDED ADDITIONAL SYMBOLS**

The experts agreed that the classification would be incomplete without a mention of the complications of pneumoconiosis or the other abnormalities seen on radiographs. The discussion showed how difficult it was to decide which complication should be mentioned and which should be omitted. It was also difficult to fix the lower limits of the complications which did deserve mention. For these reasons it was decided that the use of additional symbols should remain optional, but was strongly recommended because, in particular, useful statistical comparisons could be made.

It was also decided to denote the complications or abnormalities by symbols of two letters, in brackets, in order to avoid any confusion with the symbols p, m, n, etc. They were listed in alphabetical order to avoid giving any impression of a priority which it was difficult to determine. The experts indicated that several of these symbols could be used at the same time in cases where several complications or abnormalities co-existed on the same film.

The following symbols and definitions were adopted :

(co): abnormalities of the cardiac outline; to be replaced by (cp): cor pulmonale, if this condition is strongly suspected ;

(cv): cavity;

(di): significant distortion of the intra-thoracic organs;

(em): marked emphysema;

(hi): marked abnormalities of the hilar shadows ;

(pl): significant pleural abnormalities ;

(px): pneumothorax;

(tb): opacities suggestive of active tuberculosis.

It was decided that the symbol (tb) should denote all those radiological opacities suspected of active tuberculosis in order to underline the need for carrying out all other necessary examinations.

Finally, it was decided that the classification should contain a category indicating films without radiographic evidence of pneumoconiosis and denoted by the symbol "O". This symbol could, where necessary be supplemented by the use of the recommended additional symbols.

**INTERNATIONAL CLASSIFICATION OF PERSISTENT RADIOLOGICAL OPACITIES IN THE LUNG FILMS PROVOKED BY THE INHALATION OF MINERAL DUSTS\***  
(Geneva, 1958)

	No pneumoconiosis	SUSPECT	PNEUMOCONIOSIS									
Type of opacity			Linear opacities	Small opacities						Large opacities		
Qualitative features	O	Z	L	p		m		n		A	B	C
Quantitative features				1	2	3	1	2	3			
Additional symbols	(co)/(cp)	(cv)	(di)	(em)			(hi)	(pi)	(px)		(tb)	

\*including coal and carbon dusts

### DEFINITIONS AND COMMENTS

The object of the classification is to codify the radiological appearances of the pneumoconioses in a simple, easily reproducible way. It is intended to describe the radiographic appearances of the persistent opacities associated with pneumoconiosis, not to denote pathological entities, nor to take into account the question of working capacity.

Where there is an appreciable difference in the appearance of the two lungs, the two appearances may be described separately, beginning with the right lung.

#### Schematic Representation of the Classification :

The experts prepared a schematic representation of the classification, which is reproduced below. This scheme should be used in conjunction with the definitions and the standards films.

No pneumoconiosis	O No radiographic evidence of pneumoconiosis
Suspect opacities	Z Increased lung markings
	Pneumoconiosis
Linear opacities	L Numerous linear or reticular opacities, the lung pattern being normal, accentuated or obscured
1 Small opacities	<p>The following types are defined according to the greatest diameter of the predominant opacities. The categorisation depends on the profusion of the opacities.</p> <p>p Punctiform opacities. Size up to 1.5 mm. Category 1: A small number of opacities in an area equivalent to at least two anterior rib spaces and at the most not greater than one-third of the two lung fields.</p> <p>m Micro-nodular or miliary opacities. Greatest diameter between 1.5 and 3 mm. Category 2: Opacities more numerous and diffuse than in category 1 and distributed over most of the lung fields.</p> <p>n Nodular opacities. Size between 3 and 10 mm. Category 3: Very numerous profuse opacities covering the whole of the lung fields.</p>
2 Large Opacities.	<p>A An opacity having a longest diameter of between 1 and 5 cm, or several opacities each greater than 1cm, the sum of whose longest diameters does not exceed 5 cm.</p> <p>B One or more opacities, large or more numerous than those in category A, whose combined area does not exceed one-third of one lung field.</p> <p>C One or more large opacities, whose combined area exceeds one-third of one lung field.</p>
Additional symbols	
3 Recommended addition symbols	<p>(co) abnormalities of the cardiac outline. To be replaced by (co): cor pulmonale, if this condition is strongly suspected.</p> <p>(cv) cavity</p> <p>(di) significant distortion of the intra-thoracic organs</p> <p>(em) marked emphysema</p> <p>(hi) marked abnormalities of the hilar shadows</p> <p>(pl) significant pleural abnormalities</p> <p>(px) pneumothorax</p> <p>(tb) opacities suggestive of active tuberculosis</p>
1. The choice of order of the symbols is left to the convenience of the physician. 2. The background of small opacities should be specified as far as possible. 3 The use of these symbols is optional.	

## APPLICATION OF THE CLASSIFICATION TO MINIATURE (Radiography (Photofluorography))

There was a long discussion on the question of the possible application of the classification to miniature films. The great progress made in the last few years in the techniques of miniature radiography and the generalised use on a large scale of this particularly cheap method of making systematic serial examinations, made it necessary to consider the application of the classification to small films. One solution might have been to make no reference to metrical measurement, but nevertheless, in order not to lose useful criteria, it was accepted that it would always be possible to make a mental adjustment proportionate to the size of the miniature film or to read it by projecting the miniature up to standard size.

The experts however, stressed that even with the best available techniques, trials had shown that the difference in the interpretation of the films by different observers increased as the size of the films diminished, and that the diagnosis of "p" opacities and of category 1 was particularly difficult. They stressed the need to employ mirror cameras, films of at least 70 by 70 mm, and only to use a perfect technique.

The experts recognised that, with existing techniques of photofluorography, there was an increased radiation dosage as compared with large films, and recommended that all possible measures should be taken to reduce radiation exposure to a minimum.

As the problems of applying the classification to miniature films had not yet been sufficiently studied, it was recommended that comparative trials should continue. Following the normal practice, all suspect miniature films should be systematically re-examined using a standard film.

## II. SELECTION OF A SET OF STANDARD RADIOGRAPHS ILLUSTRATING THE CLASSIFICATION

The experts agreed that the inadequacies of the verbal descriptions were such that standard films illustrating the various radiographic appearances defined in the classification were necessary. They also agreed that an accurate and uniform application of the classification could only be achieved by having a sufficient number of sets of standard, films available.

They examined several hundred films, preselected as the most typical illustrating the qualitative and quantitative features of the radiographic appearances of the pneumoconioses and the different appearances they could have in certain industries and with certain types of dust exposure.

They recognised that it would be useful to establish a set of standard films, representative of the greatest possible number of radiographic appearances of the pneumoconioses, but, for economic reasons and to ensure the widest possible distribution of the collection, they decided to limit it for the present, to a set representing only the middle stage of each category. In view of the classification finally adopted, the experts considered that the films available at the Meeting did not exactly illustrate certain categories, and decided to complete the set of standard films at a later date.



The experts examined the reproductions of original films provided by a number of manufacturers. They unanimously recognised the fidelity of these reproductions and considered that they possessed all the necessary technical qualities.

It was recommended that the final selection of a definitive set of standard radiographs and the master copies from which the set will be reproduced should be entrusted to a small group of experts working in close collaboration with the I.L.O. and consisting of Dr. A.I.G. McLaughlin, Dr. V. Van Mehelen and D. A.L. Cochran.

The experts recommended that the Office should (1) complete as soon as possible the definitive selection of the set of standard radiographs; (2) attach to the classification a set of reproduction of the standard radiographs selected; and (3) give the widest possible publicity to this illustrated classification.

### III. QUESTIONS OF RADIOLOGICAL TECHNIQUE RELATIVE TO THE CLASSIFICATION.

In order to deal with this question a small sub-committee was appointed consisting of Professor Oosthuizen, Dr. Cochran and Professor Dmukhovski.

A number of minimum technical requirements were regarded, as necessary for the purpose of achieving satisfactory radiographic technique and standardisation. On the basis of the report of the sub-committee the experts decided, after discussion, to make the following recommendations:

- (a) an X-ray generator with full rectification should be used with a minimum capacity of 200 mA but preferably of 400 mA, equipped with a voltage regulator and synchronous time switch; it is recommended that, wherever possible, an electronic time switch should be used;
- (b) the unit should be fitted with a rotating anode tube with a target of no more than 2X2 mm. and equipped, wherever possible, with an adjustable diaphragm to reduce scatter and excessive radiation to a minimum;
- (c) a minimum of 60 KV but preferably of 70 KV is recommended;
- (d) the voltage drop in the current supply should not exceed 10 percent;
- (e) intensifying screens should be used, of the general purpose type, of medium speed, clean, with a smooth surface, and in close contact with the film at all points;
- (f) a short exposure time of at most 0.1 second, but preferably of the order of 0.05 second is recommended;
- (g) films should be of general purpose type, of medium sensitivity and sufficiently large to cover the whole of the lung fields including the costophrenic angles;
- (h) the tube-film distance should be fixed and this distance should not be less than 150 cm (5 feet);
- (i) correct centering of the tube and positioning of the patient is important; the tube should be centered on the fourth thoracic vertebra, the subject stripped to the waist and placed in such a position as to bring the scapulae outside the lung fields. The film should be taken in mid-inspiration.

- (j) great care should be exercised with dark-room technique, with insistence on constant temperature processing and the use of fresh film, developer and fixer; it is recommended that a minimum of 5 minutes be allowed for developing, or longer depending on the type of film used, 10 minutes for fixing and 30 minutes for washing; washing should be carried out in running water or in water frequently changed; it is further recommended that where ever possible, automatic processing should be used;
- (k) the use of a photo-timer helps standardisation and is therefore recommended ;
- (l) the use of a fixed or movable anti-diffusion grid is recommended for use with subjects having an antero-posterior diameter of more than 25 cm.

The quality of a chest radiograph depends on the extent, clarity and contrast of the details that can be seen by the person reading the film. It was generally agreed that the vertebral bodies should be visible through the heart shadow but not the intervertebral discs. The latter should be visible through the trachea. It is not intended that this should prevent the use and development of new techniques such as high voltage radiography and the more advanced types of photo-timer.

#### IV RELATED QUESTIONS

The experts stressed the value to the Office of following closely developments in the pneumoconioses and, in particular, of achieving international application of the classification. The I.L.O. has already convened a number of scientific meetings in various countries and has been represented at others where problems of classification have been discussed. While in many countries the previous international classification has been widely used there are some, notable the United States and the Union of South Africa, in which the international classification had not yet found general acceptance. In this connection, reference was made to an international meeting of experts on pneumoconiosis shortly to be held in Johannesburg, to which the Office has been invited to send representatives.

It was agreed that there was a lack of quantitative evidence available to the Meeting about the use and reproducibility in various parts of the world of the Sydney classification. To remedy this, it was suggested that sets of about 100 films should be circulated to centres in different countries, with the request that these films should be categorised according to the new international classification. A simple statistical analysis of the results would give a very clear picture of the value and limitations of the new classification.

## Annexure 'D'

### GRADING OF SILICOSIS

The Committee on Pneumoconiosis and the Committee on Standard Practices in Compensation of Occupational Diseases of the American Public Health Association in a report on silicosis described the stages of the diseases as follows :

The disease is divided arbitrarily into first, second and third stages for convenience of description and possible compensation purposes.

**First Stage :** The symptoms of uncomplicated first-stage silicosis are few and often indefinite. The man may apparently be quite well and his working capacity not noticeably impaired. Slight shortness of breath on exertion and some unproductive cough, often with recurrent colds, are the most usual symptoms. The man may have a little less ability to expand his chest than formerly, and the elasticity of the chest may be slightly impaired. The earliest specific indication of the presence of silicosis is the radiographic appearance, consisting of generalized arborization throughout both lung fields with more or less small, discrete mottling.

This characteristic mottling is due to shadows cast by the discrete individual nodules of fibrous tissue in the lungs and is essential to the diagnosis of silicosis. Without this finding the diagnosis of silicosis is not sustained except by autopsy.

**Second Stage.** A definite shortness of breath on exertion is usually found, and pains in the chest are a frequent complaint. A dry morning cough is often present, sometimes with vomiting, and recurrent colds are more frequent. Even then the man's appearance may be healthy, but he is dyspnoeic on exertion, he cannot work as well as formerly, his chest expansion is noticeably decreased, the movement being sluggish and diminished in elasticity.

The characteristic radiographic appearance is a generalized medium-sized mottling throughout both lung fields. The shadows of the individual nodules are for the most part discrete and well-defined on a background of fibrous arborization, but there may be here and there larger but limited opacities due to irregular pleural thickening or to a localized aggregation of nodules.

**Third Stage :** In the third stage the shortness of breath is marked and distressing even on slight exertion. The cough is more frequent; the expectoration is in most cases slight but may be copious. The individual's capacity for work becomes seriously and permanently impaired; his expansion is greatly decreased even with forced inspiration; he may lose flesh; his pulse rate may be increased, and his heart may become dilated.

The radiographic appearances in the third stage are further accentuated, the mottling is more intense, the nodules are larger and take on a conglomerate form so that large shadows are shown corresponding to areas of dense fibrosis.

Physical examination of an individual may reveal changes in percussion and auscultation, mild in the first stage and increasing with the progress of the disease. These alone are not sufficient to be of great value in diagnosis of silicosis.

## Annexure 'E'

### NOTES ON COMPENSABLE DUST DISEASES

#### "SILICOSIS"

**Definition :** Silicosis is a scarring disease of the lungs due to the inhalation of dust containing free silica, (silicon dioxide). A long period of exposure (2-20 years) is required for the development of the disease. Pathologically, the disease is characterized by miliary nodular scarring, the small nodules in the later stages fusing to form larger nodules, and finally forming conglomerate (tumorous) masses. Fairly typical X-ray appearances mark out the various stages of the disease.

**Causative Agent :** (Chemical symbol:  $\text{SiO}_2$ ) Synonym: silicon dioxide. Silica is a very hard crystalline material which occurs abundantly in nature in rocks and soil.

**Occupations involved :** The occupations in which there is a potential exposure to free silica include the following :

Abrasive makers, Brick makers (refractory), foundry workers, glass mixers, grinders (metal), miners, polishers (metal), pottery workers, rock crushers, sandblasters, sanders, sand pulverizers, scouring powder makers, stone dressers, tumbling barrel workers.

**Pathogenesis :** The silica particles reach the walls of the air sacs where they are engulfed by specialized white blood cells. Many of the particles are in this way discharged with the sputum; but, others enter the lung lymphatic stream, from where they are carried to the lymph glands. At the glands the wandering white blood cells disintegrate, leaving behind the silica particles which cause further damage. They stimulate the development of nodular bundles of scar tissue, microscopic in size; and, as more of these nodules form, they become fused to form larger nodules which eventually obstruct the normal passage of lymphatic fluid through the lymph glands.

When this occurs, the further passage of silica-laden scavenger cells to the pulmonary lymph glands occurs with difficulty. Now, new foci in the lung lymphatic vessel chain act as depots for the dust-laden cells, and nodular scarring forms at these locations also. This latter action leads to the widely scattered nodules found in the lungs at this stage.

The fusion of the nodules to each other gradually results in the appearance of large tumorous masses. It is believed by some authorities that this stage is invariably associated with tuberculosis. There is little doubt, however, that silica dust in the lungs predisposes to the onset or progression of pulmonary tuberculosis.

At any stage, but more frequently at the later stages, stretching of the air sacs of the lungs occurs. It is likely that this phenomenon, in addition to the constricting action of silica on the bronchial tubes is the chief cause of dyspnoea in silicosis.

At any stage, but more frequently in later stages, symptoms develop. These consist of dyspnoea, either on exertion or at rest, cough and often a sense of tightness in the chest. Physical examination reveals nothing that is typical. Some indeterminate rales (abnormal sounds in the lungs) may be found. The existence of the nodules themselves, the typical scarring of silicosis is not revealed by any special objective signs, except by chest X-ray.

The chest X-ray is fairly typical, if one can rule out such conditions as rheumatic heart disease with chronic heart failure, fungus disease of the lungs, iron dust deposition, pulmonary sarcoidosis and eosinophilic lungs. It is obvious, therefore, that physical examination and a good occupational history are necessary before one can adequately interpret the chest X-ray as that of silicosis.

### COAL MINERS' PNEUMOCONIOSIS

A condition of the lungs which is induced by colliery dusts.

**Causative Agent :** The dust which a coal miner breathes is complex. Besides the dust arising from disintegration of coal which is intimately associated with other minerals, siliceous dusts of various types are derived from the rock strata above and below the coal seam.

**Pathogenesis :** A characteristic feature of the sectioned diseased lung of a coal miner shows generalised blackening with black consolidated areas and between these the tissue may be oedematous or there may be areas of spongy emphysema. Cavitation may occur even in the absence of tuberculosis.

Microscopically, the alveoli are seen to be crowded with mono-cytes, the cytoplasm of which is packed with dust. Similar cells are found in lymphatic channels and in lymph nodes. Dust-laden cells form around the blood vessels and bronchioles. Soft dust foci upto 5 mm diameter are seen. When fibrosis develops fine reticulin fibers are replaced by coarse, tougher collagen fibres. Later, fibrosis and nodules form. Subsequently, there is inter-alveolar fibrosis. Focal emphysematous areas form. The nodules may be whorled or laminated. Emphysema is a more characteristic feature of coal dust pneumoconiosis than fibrosis.

**Symptoms :** Pneumoconiosis of coal miners is a progressive condition gradually passing on from its harmless early stages through a condition of some respiratory embarrassment, until it goes to a condition of dyspnoea and breathlessness which makes work impossible.

The simple pneumoconiosis manifests itself by dyspnoea. Emphysema is responsible for much of the disablement of uncomplicated pneumoconiosis. There is little deterioration in health but secondary infection may lead to serious consequences.

In the development of massive fibrosis in coal miners two factors are necessary; they are dust and tuberculosis. Now areas of massive fibrosis which include large infected nodules get superimposed on the general picture of multiple small nodules which may be up to 1 cm in diameter. The pleura is thick and lungs may adhere to the chest wall. The nodules are solid, showing less emphysema than is characteristic of non-infected nodules.

The frequency of cough increases with melanoptysis (black inky sputum), dyspnoea becomes marked and the patient becomes orthopnoeic. Pain and tightness in the chest increases and attacks like those of asthma more marked in the early morning occur.

**Diagnosis :** Depends primarily on the radiographic examination.

### ASBESTOSIS\*

Asbestosis is a chronic disease. The lesions take some years to develop. In some circumstances silicosis may develop extremely rapidly and death may occur within two or three years of the first exposure, but such rapid development never occurs with asbestosis.

**Causative Agent :** Chrysotile,  $3 \text{ Mg O} \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$  is the main asbestos of commerce but crocidolite and amosite are also used. The long-fibre yarn (chrysotile, fibre length  $\frac{3}{4}$ —inch or more, amosite up to 6 inches) is used.

**Occupations involved :** The occupations in which there is a potential exposure to asbestos dust include the following :

Asbestos textiles.  
Packing gaskets.  
Making goods of asbestos/cement.

Making of paper and board, filter pads, brake blocks, brake linings and asbestos cement, paints, plaster. Use as a mineral filler in plastics.

The manufacturing processes entail the breaking up of massive asbestos into fibres.

**Pathogenesis :** Asbestosis is a chronic disease. The lesions take some years to develop. The fibrosis is much more diffuse than due to silica. There is a fine-net work throughout the lung.

A visual examination of a sectioned lung reveals tissue which is interspersed with sharply outlined air-free greyish black areas. Microscopically, the lung sections are seen to contain many asbestos fibres which lie in the alveoli and air ducts and in the lymphatic and connective tissue. There are few fibres in the lymph gland. Emphysema is always observed in sections in post-mortem cases. There is considerable phagocytosis of the disintegration products of the fibres.

The characteristic feature is the presence of large numbers of peculiarly shaped structures (asbestosis bodies). These bodies form rapidly in the lungs and they may appear in the sputum within 5 months of exposure. Their presence in the lung or sputum does not necessarily indicate a condition of pulmonary asbestosis. They appear as golden-yellow structures sometimes having the shape of a dumb-bell but more often in the form of a string of irregularly shaped discs, the "string of boards". At the ends are club-like protuberances.

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\* Holt. P. F., Pneumoconiosis-Edward Arnold (Publishers) Ltd., London 1957.

**X-ray features :** The lung fields are seen to be interspersed with very poor, shadowy, round spots. They are mostly undefined but occasionally are sharp and they are denser in the middle and lower regions of the lung. The growth of diffuse connective tissues is greater in the lower part of the lung. The radiographs have the appearance of ground glass. The more chronic forms of the disease show up as shadows which are coarser and more granular in appearance.

**Symptoms:** The most obvious symptoms are those of dyspnoea, cough, non-productive rarely blood-streaked, diminution of expansion of chest in proportion to the degree of fibrosis of the lungs.

Tuberculosis may be present but asbestosis is not accompanied by a predisposition to tuberculosis, as in silicosis.

There is loss of appetite, lassitude, pain in chest, dyspnoea, cough, cyanosis and loss of weight.

### BAGASSOSIS

**Definition :** Bagassosis is an industrial disease of the lung caused by inhalation of bagasse dust. It manifests itself as an acute allergic response due to sensitisation of the individual to bagasse dust.

**Causative agent :** Bagasse, is the waste product of sugar cane after extraction of sugar. Whether bagassosis is caused by fungi, bacteria or a series of organisms associated with the dust or by an allergy to the bagasse or its possible bacterial contaminants or their products or by some chemical or physical property of the dust or any combination of the above is still open for investigation.

**Symptoms :** In association with allergy, there is superadded bacterial infection causing acute diffuse bronchiolitis. This is the acute phase of the disease. Fever, cough with sticky sputum and breathlessness are the main symptoms of the acute phase. There is diffuse dull pain all over the chest with slight haemoptysis at times. If treated early, there is resolution of the acute inflammatory condition of the lung. When left untreated, there is fibrosis, emphysema and bronchiectasis. There is anorexia and loss of energy.

**X-ray findings :** These mostly consist of increase in the vascular shadows and increase in the hilar densities also some mottling and increase in haziness, reticulation all over the lungs. In the acute phases dense patchy shadows resembling bronchopneumonia may be seen.